<u>EROSION & SEDIMENT CONTROL NARRATIVE</u>

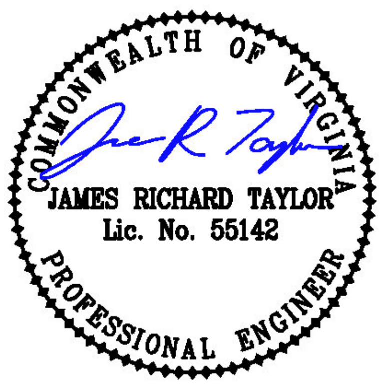
FOR

Calfee Community & Cultural Center

ROBINSON MAGISTERIAL DISTRICT
TOWN OF PULASKI, VIRGINIA

B&A Job #23220008.00

FEBRUARY 15, 2023



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SECTION I: SOIL AND EROSION CONTROL NARRATIVE

Project Description

The purpose of this project is the re-development of a historic school building and associated site work located at 1 Corbin-Harmon Drive, Pulaski, VA 24301.

Existing Site Conditions

The project site is 2.664 acres in size and currently has the historic Calfee Training School building, built in 1939. The original building has been added to over the years since 1939 and has changed ownership in recent years. This project is tasked to restore this historic building and bring forward its original architectural character as much as possible. The use of the building will be returning it to a community and cultural center that will consist of a childhood learning center, African American history museum, community kitchen, community resource center, as well as advanced digital learning lab. The corresponding site will be designed to complement the building use with outdoor learning and play areas, accessible walkways, and parking. Of note, the site also consists of a unconditioned metal storage building and a Town of Pulaski Public works pump station building. The Public works building will remain as is, and the shed building will be converted to outdoor classrooms as part of the new learning center and daycare facility.

The site is bound by Tract Fork Creek to the west and north, Corbin-Harmon Drive to the South, and remnants of a mill race to the east. This mill race continues to divert rainwater from the uphill neighborhood. Tract Fork is a jurisdictional water of the US. There are no wetlands present on site and there are currently no stormwater management BMPs serving the site.

Existing soil conditions on-site include the following types:

17 - Lindside-Nolin silt loams,
K-Factor: 0.37
pH: 6.5
Hydrologic Soil Group: C
Texture: Silt Loam

33 - Urban Land
K-Factor: 0.32
pH: 6.5
Hydrologic Soil Group: None
Texture: Mix/Silt Loam

Adjacent Areas

Adjacent areas consist of developed residential areas. The property is also adjacent to forested areas of Tract Fork Creek. The said property is mostly isolated from offsite properties by the old mill race drainage channel to the east and Tract Fork creek to the West and North and Corbin-Harmon Drive to the South. With the use of appropriate erosion and sediment control measures are planned to minimize the possibility of damage to these adjacent areas.

Off-Site Areas

No off-site areas are planned for this project. Less than 100 cubic yards of unsuitable cut material is expected to leave the site for storm drain renovations and over-excavating the parking areas. If offsite earthwork (stockpile areas) needs to occur, the contractor shall submit supplementary E&S plan and calculations covering the off-site support activities, when specific locations for the off-site areas have been selected. These E&S plans will be required to be approved by the plan approving authority before any offsite earthwork may occur. The contractor shall provide proof of permits for off-site areas that have their own approved plans. The project owner will be responsible for permanent stabilization and maintenance of the offsite areas.

Development Plans

The proposed development will consist of replacing and expanding an existing parking lot to the West and North as well as a new 8-parking space lot to the East. Roof downspouts will be replaced, and their respective drainage pipes re-done. Moving these roof drainages to a new storm drainpipe system out-falling into an existing 18” CMP drainage pipe that discharges to Tract Fork Creek. Additional yard inlets will be placed in and around the planned play areas to allow positive drainage in these active play areas. New building additions to the existing historic building.

The actual limits of land disturbance are estimated to be 0.929 acres. Expected start of construction is 2023 for the building work and site work to begin later in 2023 with a completion date of Spring/Summer 2024.

Critical Erosion Areas

The site consists of existing pavement and lawn areas that may become disturbed during construction activities. Any runoff from the site shall be controlled with temporary measures such as a construction entrance, silt fence, inlet protection, mulching and other measures per Virginia Erosion and Sediment Control Handbook standards.

The following areas are identified as critical erosion areas and shall be stabilized and monitored during construction per the erosion and sediment control practices specified on the plan:

1. Avoiding work within the Floodway and/or Jurisdiction Waters.
2. Protect existing drop inlet on the public road – Corbin-Harmon Drive

Environmental Inventory

Within the property, there are jurisdictional waters (Tract Fork Creek). There are no hydric soils, and no wetlands present. The existing old mill race is planned to be undisturbed and maintained as is. This mill race re-directs adjacent drainage from entering the project area and will be preserved to maintain this drainage separation. No steep slopes are present.

Erosion and Sediment Control Measures

All structural erosion and sediment control practices shall be done in accordance with minimum standards and specifications of the Virginia Erosion and Sediment Control handbook. Specific practices required for this project are listed in this section and on the construction plans.

Structural Practices

1. Temporary Construction Entrance – 3.02
   A temporary construction entrance shall be installed at the location of the proposed entrance.
2. Silt Fence Barrier – 3.05
   Silt fence barriers will be installed on the down slope of areas to filter sediment transported by sheet flow runoff.
3. Storm Drain Inlet Protection – 3.07
   A sediment filter or an excavated impounding area around a storm drain drop inlet or curb inlet.
4. Topsoiling – 3.30
   Topsoil shall be re-applied to all disturbed areas to provide adequate soil media for the establishment of permanent vegetation.
5. Temporary Seeding – 3.31
   The establishment of temporary vegetative cover on disturbed areas by seeding with rapidly growing annual plants.
6. Permanent Seeding – 3.32
   The establishment of perennial vegetative cover on disturbed areas by planting seed.
7. Mulching – 3.35
   Mulching shall be applied to all temporary and permanent seeding areas to protect all new seed from washing away during initial rainfall events that might occur prior to any new grass.

Maintenance

All erosion and sediment control measures used on the site shall be maintained in accordance with the Virginia Erosion and Sediment Control Handbook (VESCH) throughout the duration of the project. Maintenance procedures for each measure specified on the plan including the required frequency of regular inspections and repairs are set forth in the VESCH, latest edition, and are incorporated into this plan by reference. Specifically:

1. The storm drain inlet protection measures will be checked after each runoff producing event for sediment buildup, which will prevent drainage. Aggregate shall be replaced or cleaned when inspection reveals that clogged voids are causing ponding problems which interfere with on-site construction. Accumulated sediment shall be removed from the area around the inlet as necessary to allow foradequate ponding. Removed sediment shall be deposited in a suitable area and in such a

manner that it will not erode and cause sedimentation problems.

2. The silt fence barrier will be checked immediately after each runoff producing event and daily during prolonged rain events for undermining or deterioration of the fabric. Sediment shall be removed when the level of sediment deposition reaches halfway to the top of the barrier.
3. Construction entrance(s) shall be periodically checked and may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment.
4. Seeded areas which fail to establish a vegetative cover shall be reseeded as necessary. The seeded areas will be checked monthly to ensure that a good stand is maintained. Areas should be fertilized and reseeded as necessary.

Management Strategies

1. Construction will be sequenced so that grading operations can begin and end as quickly as possible.
2. Sediment trapping measures will be installed as a first step in grading and will be seeded and mulched immediately following installation.
3. Temporary seeding or other stabilization will follow immediately after grading.
4. Areas which are not to be disturbed will be clearly marked by flags, signs, etc.
5. The job superintendent/responsible land disturber shall be responsible for the installation and maintenance of all erosion and sediment control practices.
6. After achieving stabilization, the temporary E & S controls will be cleaned up and removed.

For specific construction installation information, see the Erosion Control & Construction Sequence located in the construction plans.

Stabilization Measures

During construction, temporary seeding shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 14 days. Temporary stabilization plant materials and recommended liming application rates can be found in VESCH STD & SPEC 3.31 and tables 3.31-A and 3.31-B on the plan set.

All disturbed areas will be permanently stabilized through either permanent seeding (STD & SPEC 3.32), blankets and matting (STD & SPEC 3.36), or the placement of asphalt pavement or sidewalks. Soil tests will not be performed prior to plan approval for this site. Required seeding, fertilizer and lime, and mulching specifications are given in the attached tables 3.32-C, 3.32-F, and 3.35-A. After all construction has completed onsite, all silt fences shall remain in place until a good stand of grass is achieved onsite and all areas of erosion concern have been stabilized. Any areas that have not achieved a good stand of grass shall be reseeded or have blanket matting applied to the area to ensure that permanent stabilization is achieved. During construction, the contractor shall be responsible for maintenance and repair of the ESC measures. After construction, the developer shall be responsible for ensuring that the site remains stabilized.

SECTION II: STORMWATER MANAGEMENT SUMMARY

The land disturbing activity involves renovation of an existing historical structure and minor site improvements to add paved parking, utilities, and drainage structures to better serve the proposed use. Minor grade changes are required to ensure positive drainage away from the structure and provide handicap accessibility. The site sits adjacent to Tract Fork creek and much of the site water will be directed into an existing storm drain outfall.

The proposed construction activity disturbs greater than 10,000 square feet but less than one (1) acre of land and is therefore exempt from obtaining a stormwater permit pursuant to the Town of Pulaski Stormwater Ordinance and VSMP Regulations. As such, no water quality controls are required. The proposed activity has been evaluated for potential impacts to properties and waterways downstream of the site in the form of sediment deposition, erosion, and damage due to increases in volume, velocity, and peak flow rate of stormwater runoff in accordance with the Virginia Erosion & Sediment Control Law and Minimum Standard 19.

Due to the site's location directly adjacent to a large creek, the site will be compliant with the applicable water quantity criteria by virtue of adequate conveyances to the discharge outfall into the creek. Compliance with the applicable channel and flood protection criteria is demonstrated herein.

PRE-DEVELOPMENT SUMMARY

Please see sheet C7 for drainage area maps.

The pre-development site[1] consists of a flat topography with an existing former mill race drainage ditch to the East, and direct run-off is primarily sheet flow directly into Tract Fork Creek to the West and North property edges. The existing building has downspout drains that eventually outlet into Tract Fork as well, their condition is assumed to no longer be functional with these site plans proposing to replace and re-direct to an existing storm drain pipe near Corbin-Harmon Drive. Grassed areas on the east side of the building have poor slopes for drainage including low spots and are known to experience localized flooding. Outside of the existing storm drain pipe, there is no evidence of concentrated flow prior to the runoff reaching Tract Fork Creek, other than the old mill race drainage ditch which is not being impacted or utilized. The site is analyzed based on a single point of analysis at existing drainage pipe. Existing roof run-off leaders are assumed to be compromised and to be replaced. Run-off from the remainder of the site is generally by sheet flow directly to Tract Fork Creek.

All volume routing and peak flow calculations have been analyzed using the SCS/TR-20, weighted-Q method. All storm sewer conveyance systems have been analyzed using the Rational Method in accordance with VDOT standards, unless otherwise noted. Rainfall intensity values taken from NOAA Atlas 14 (Pulaski County, 37.1401° -80.5775°) for SCS/TR-55 calculations and VDOT Pulaski County BDE factors (Appendix 6C-2) for Rational Method calculations. Please see the attached "Hydrology Worksheet" and HydroCAD for time of concentration calculations.

Table 1: Pre-Development Area Summary

Area (acres)	CN	Description (subcatchment-numbers)
0.612	74	>75% Grass cover, HSG C (1S)
0.293	98	Paved Parking/Roof, HSG C (1S)
0.905	**82**	**TOTAL AREA**

[1] In the context of stormwater management, "site" shall be defined as the land or water area where the land-disturbing activity is physically conducted, including the limits of any off-site land disturbance. This applicable area totals 0.929 acres, as shown on sheet C8 of the construction plans.

POST-DEVELOPMENT SUMMARY

Please see sheet C7 for drainage area maps.

In the post-development condition, the site is restored to a substantially similar condition of lawn, roofs with connected downspouts, and parking. The west side of the building contains the renovated parking area and continues to be graded in a manner to encourage sheet flow of the area directly into the creek, similar to the pre-development condition. Around the east and south sides of the building, runoff is captured into a series of roof and yard drains designed to reduce the occurrence of localized flooding around the building. These concentrated flows are piped to connect into the existing storm drain which outfalls directly into Tract Fork creek.

Tables 2 – 4 below summarize the change in land cover and runoff characteristics associated with the proposed land disturbing activity. It is noted that the disturbance results in an increase in peak runoff rate and velocity, however, this increase is permitted due to the limited limits of land disturbance (<1.0 acre) and compliance with the applicable channel and flood protection criteria as described herein. Compliance with the channel and flood protection criteria satisfy the requirements of Virginia Minimum Standard 19.

Table 2: Post-Development Area Summary

Area (acres)	CN	Description (subcatchment-numbers)
0.370	74	>75% Grass cover, HSG C (1S)
0.535	98	Paved Parking/Roof, HSG C (1S)
0.905	**88**	**TOTAL AREA**

Table 3: Peak Discharge Assessment

	Pre-development Peak Flow	Post-development Peak Flow	% Change
1-YR	0.65 cfs	1.01 cfs	**+55.4%**
2-YR	0.89 cfs	1.29 cfs	**+44.9%**
10-YR	1.61 cfs	2.06 cfs	**+27.9%**

Table 4: Run-off Volume Assessment

	Pre-development Run-off Volume	Post-development Run-off Volume	% Change
1-YR	0.059 af	0.088 af	**+49.2%**
2-YR	0.080 af	0.112 af	**+40.0%**
10-YR	0.142 af	0.183 af	**+28.9%**

Channel Protection

In accordance with 9VAC25-870-66 (B), all concentrated stormwater flows have been discharged directly through a stormwater conveyance system. On the Calfee CCC site, this pertains to all roof drains and yard drain inlets which are piped and connected to an existing storm drain near Corbin-Harmon Drive. This conveyance system carries flows from the site to a point (storm drain outfall into Tract Fork) where the contributing drainage area is less than or equal to 1.0% of the total watershed area as defined in subdivision 4 (a) of the regulations. This point of discharge represents 0.93 acres of site discharge into a watershed of 16,320 acres (0.00006%).

The manmade conveyances on the site to the limit of analysis consist of new HDPE storm drains and existing corrugated metal pipe. As shown in the storm drain calculations in Appendix B, the maximum 2-yr velocity through the HDPE conveyances is 5.46 fps and the maximum velocity through the corrugated metal conveyances is 4.72 fps. Since the maximum allowable velocity without scour protection is 12.0 fps for HDPE pipe and 5.0 fps for corrugated metal pipe, the proposed design meets the channel protection requirements.

Per subdivision (4)(a) of the regulations, the limit of analysis is reached at the outfall into Tract Fork and no further downstream analysis is required.

Flood Protection

In accordance with 9VAC25-870-66 (C), all concentrated stormwater flows have been discharged directly through a stormwater conveyance system. On the Calfee CCC site, this pertains to all roof drains and yard drain inlets which are piped and connected to an existing storm drain near Corbin-Harmon Drive. Per subdivision 3(a) of the flood protection criteria, conveyance shall be analyzed for flood protection up to the point at which they enter a mapped floodplain or other flood-prone area. Since the entire Calfee CCC site lies within the FEMA floodplain, flood protection requirements do not apply to the site.

While there are no flood protection technical criteria that apply to the site due to it being located entirely within the floodplain, the proposed on-site conveyances have been analyzed for adequacy in conveying the 10-yr design storm to ensure that localized flooding conditions are avoided around the structure. Please see the storm drain calculations provided in Appendix B.

Inlet Calculations:

1. Please see sheet C11 for Inlet Drainage Areas Map, APPENDIX C.

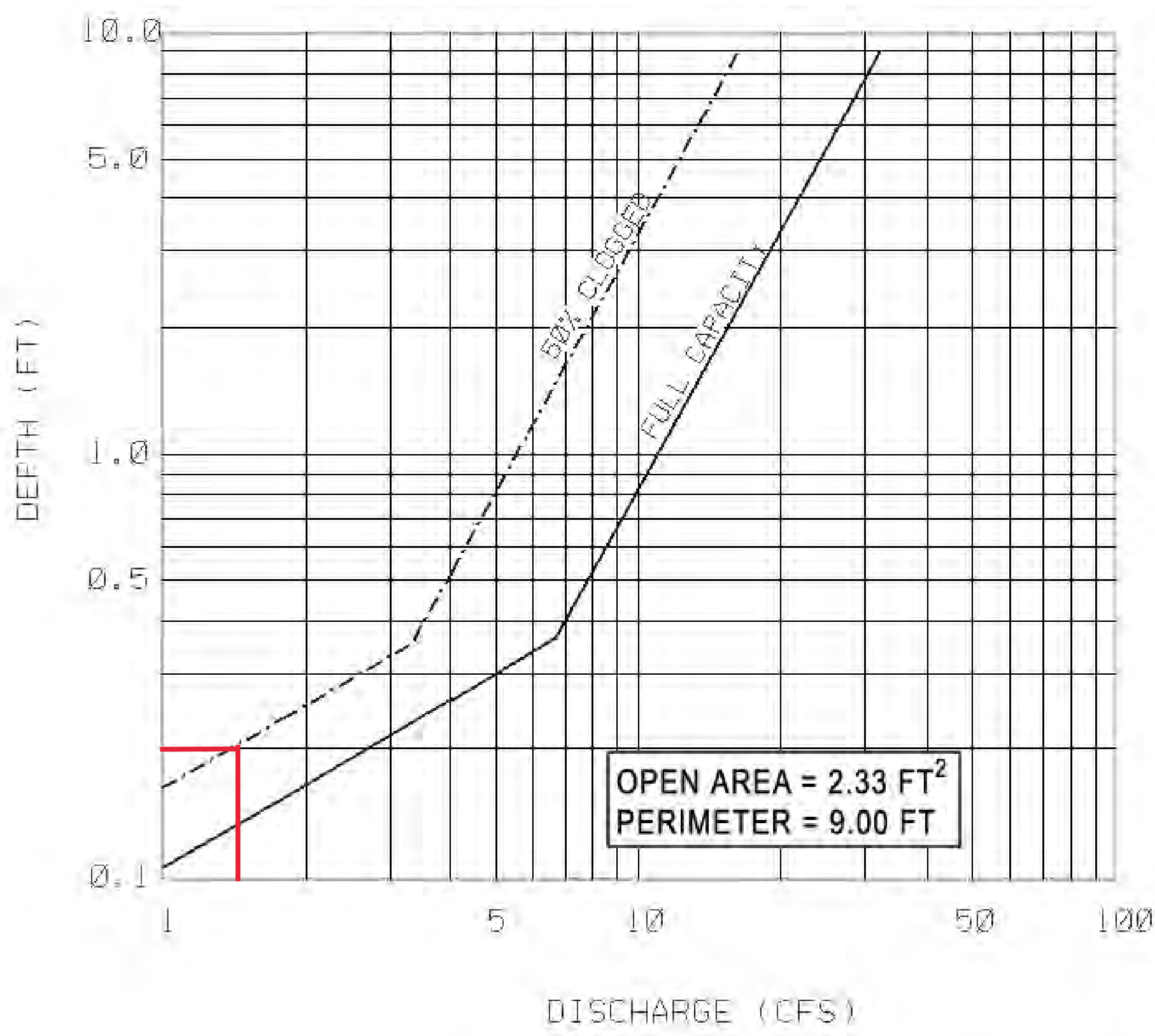
Depth versus Flow Rate for Grate Inlets

Structure	Structure Type	Q_{10}	Depth
3	Nyloplast 12” Pedestrian Grate Inlet	0.44 cfs	0.12’
5	Nyloplast 12” Pedestrian Grate Inlet	0.31 cfs	0.19’
10	Nyloplast 12” Pedestrian Grate Inlet	0.17 cfs	0.06’
12	Nyloplast 12” Pedestrian Grate Inlet	0.12 cfs	0.08’
14	Nyloplast 12” Pedestrian Grate Inlet	0.49 cfs	0.20’
18	Nyloplast 12” Pedestrian Grate Inlet	0.73 cfs	0.70’
20	VDOT DI-1 Sag Grate Inlet	0.52 cfs	0.20‘
22	Nyloplast 12” Pedestrian Grate Inlet	0.10 cfs	0.04’
24	Nyloplast 12” Pedestrian Grate Inlet	0.26 cfs	0.075’

2. Depth of flow for curb inlets is provided on the VDOT standard LD-204 calculation sheets on the following pages. Inlet capacity charts for grate inlets are included on the following pages.

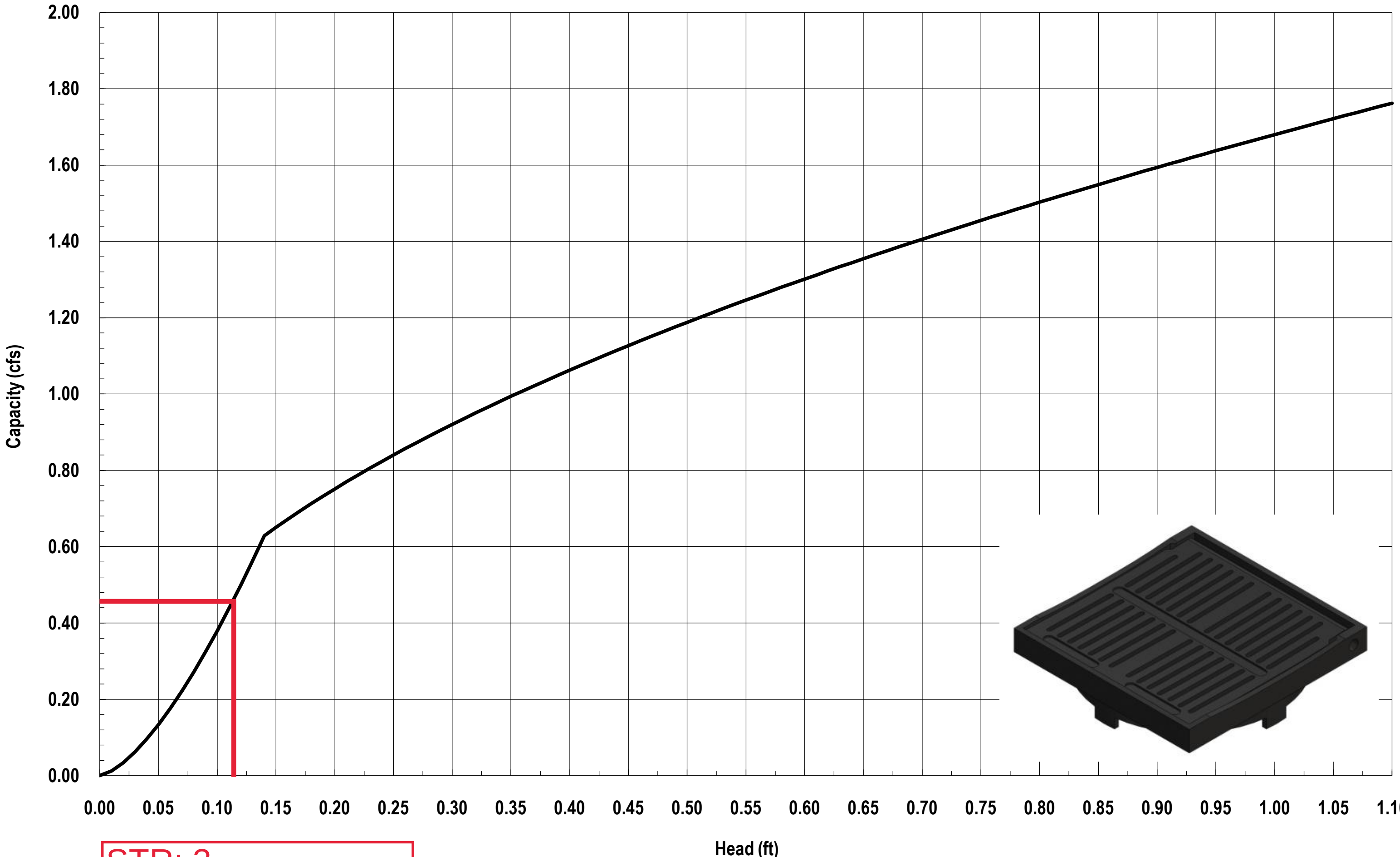
Appendix 9C-13 Performance Curve DI-1 in a Sump

STR: 20
10-YR CFS: 0.52
HEAD: 0.2 FT



Source: VDOT Transportation Research Council publication "HYDRAULIC EFFICIENCY OF GRATE INLET", 1988

Nyloplast 12" Pedestrian Grate Inlet Capacity Chart



STR: 3
10-YR CFS: 0.44
HEAD: 0.12 FT

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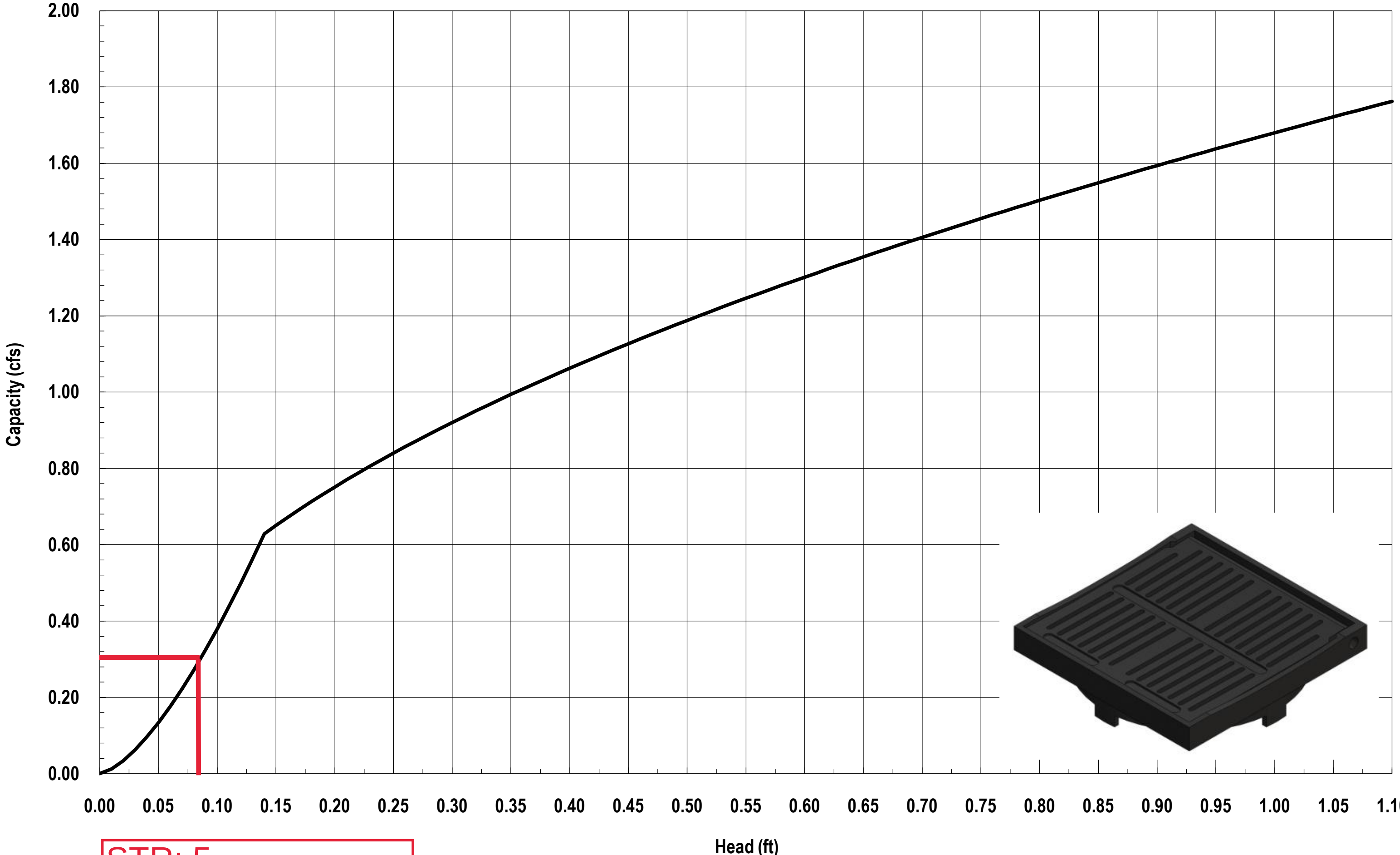
Nyloplast 12" Pedestrian Grate Inlet Capacity Chart



STR: 5
10-YR CFS: 0.31
HEAD: 0.07 FT

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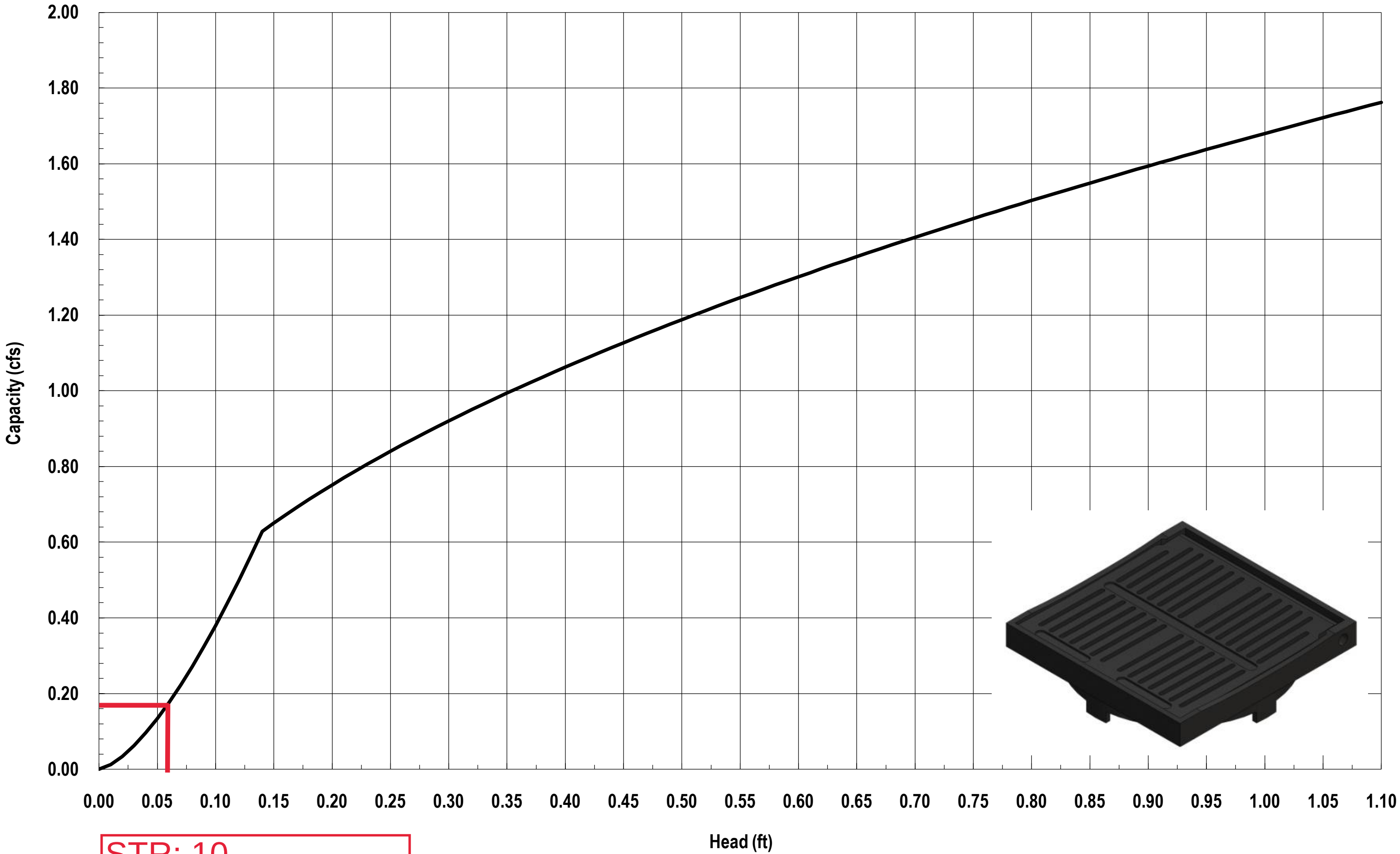

STR: 10
10-YR CFS: 0.17
HEAD: 0.06 FT

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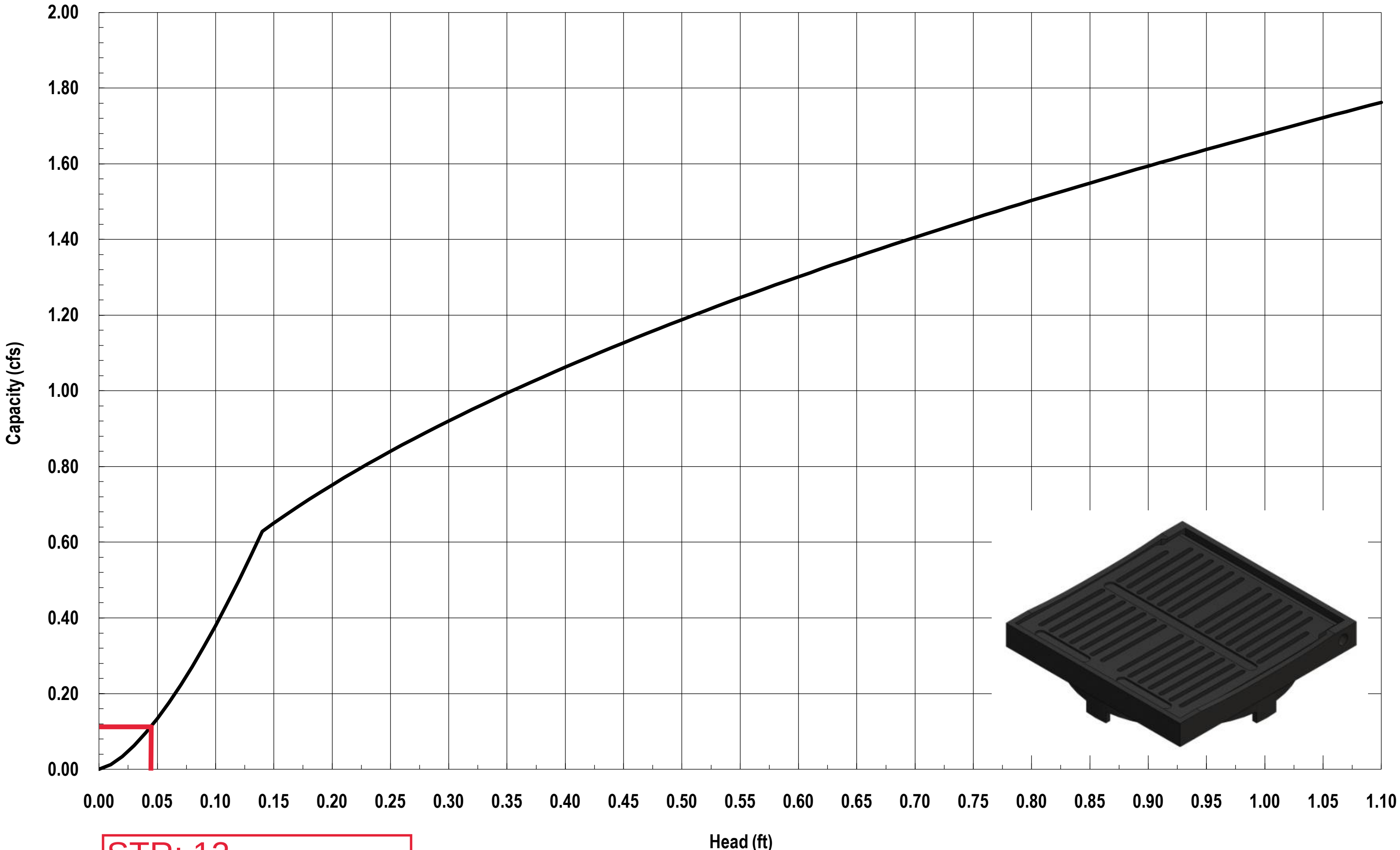

STR: 12
10-YR CFS: 0.12
HEAD: 0.04 FT

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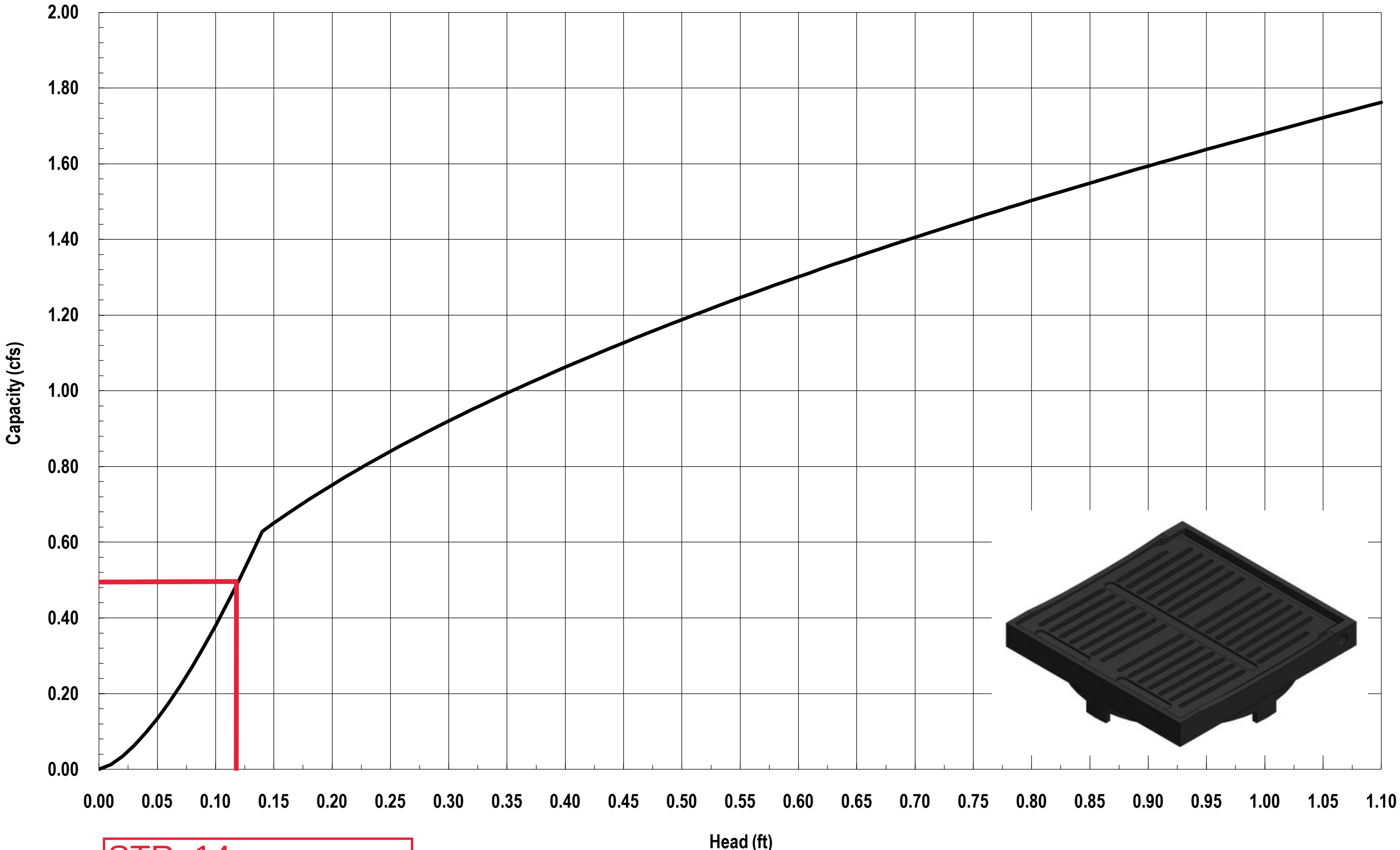

STR: 14
10-YR CFS: 0.49
HEAD: 0.12 FT

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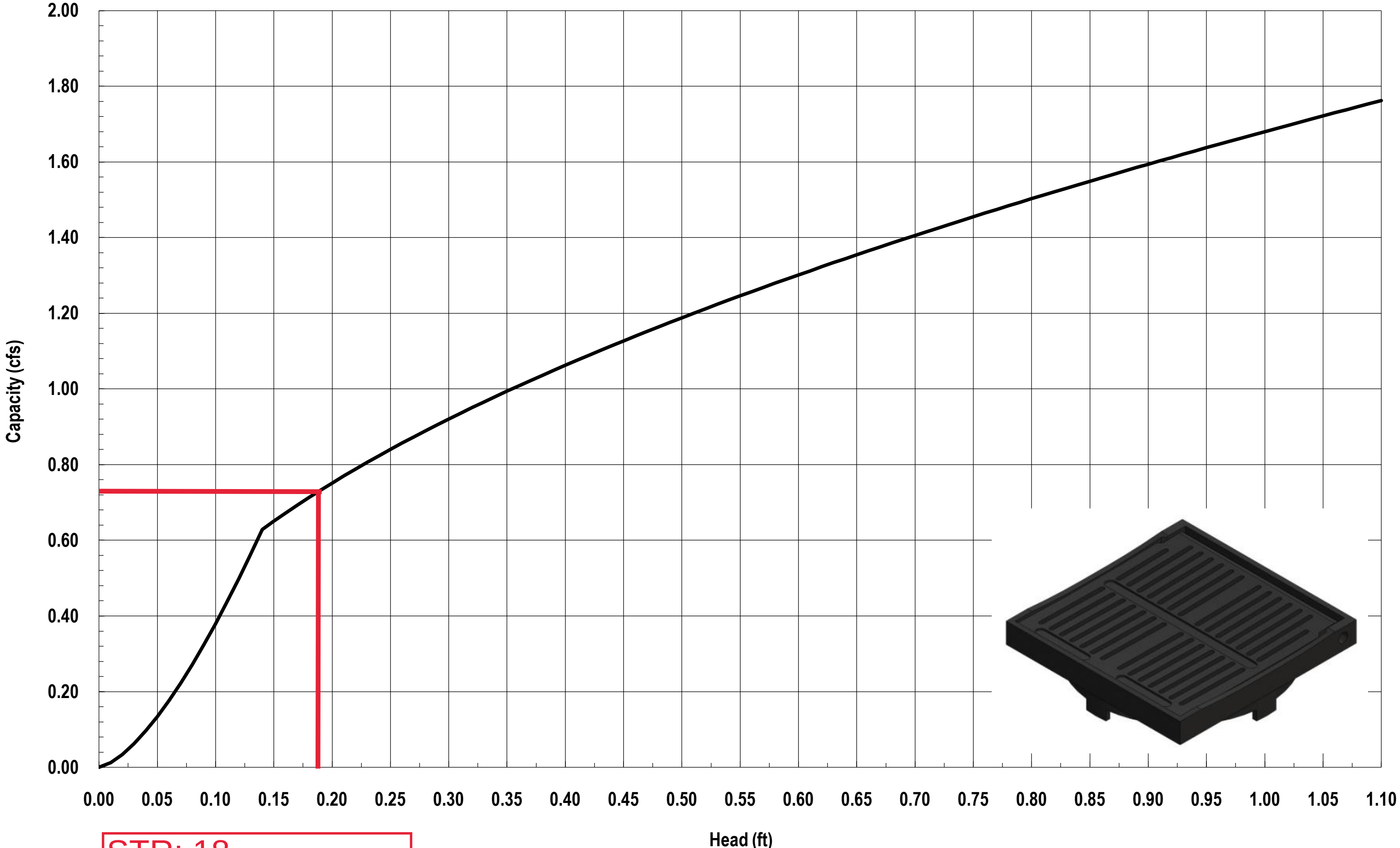

STR: 18
10-YR CFS: 0.73
HEAD: 0.18 FT

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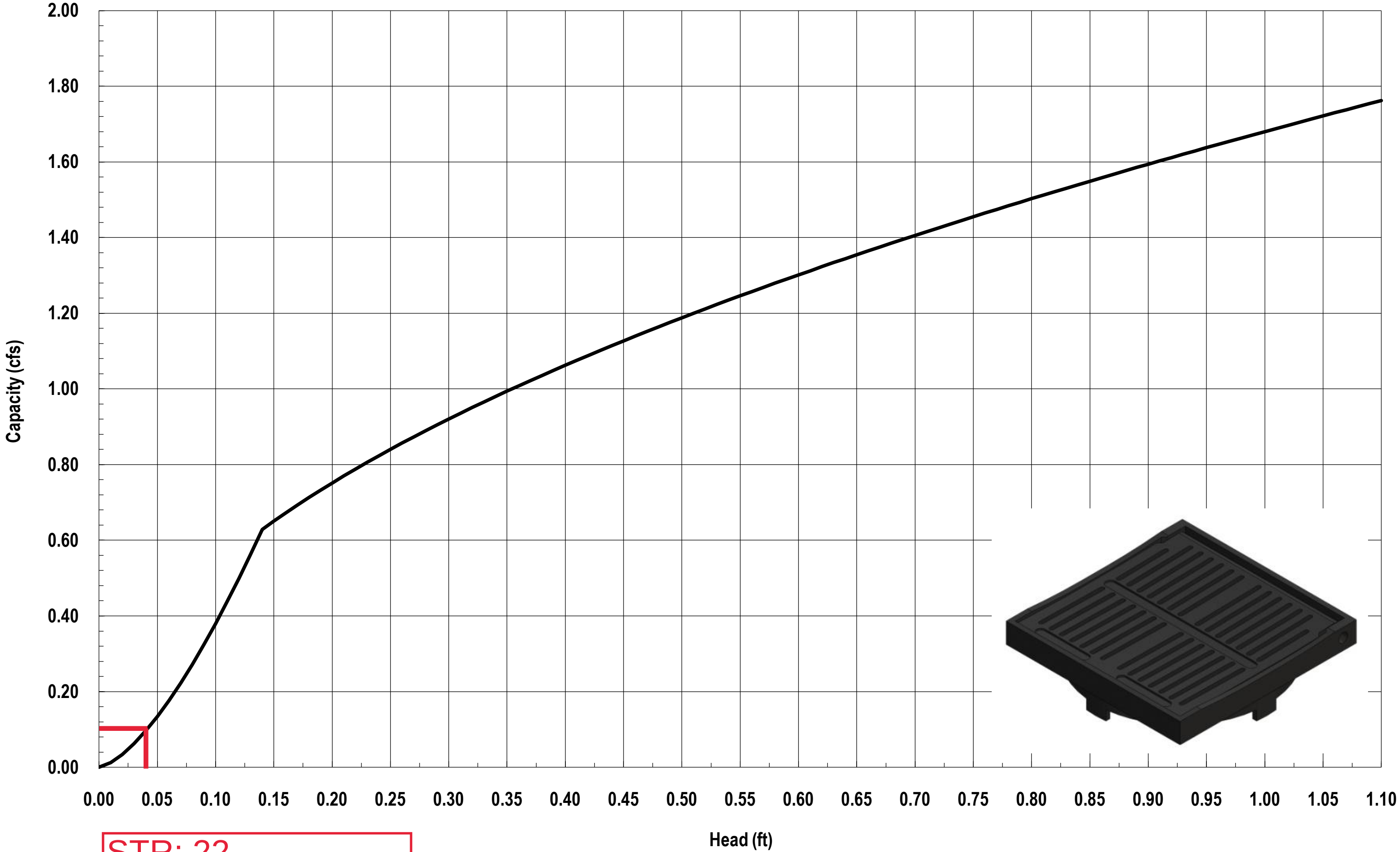
Nyloplast 12" Pedestrian Grate Inlet Capacity Chart



STR: 22
10-YR CFS: 0.10
HEAD: 0.03 FT

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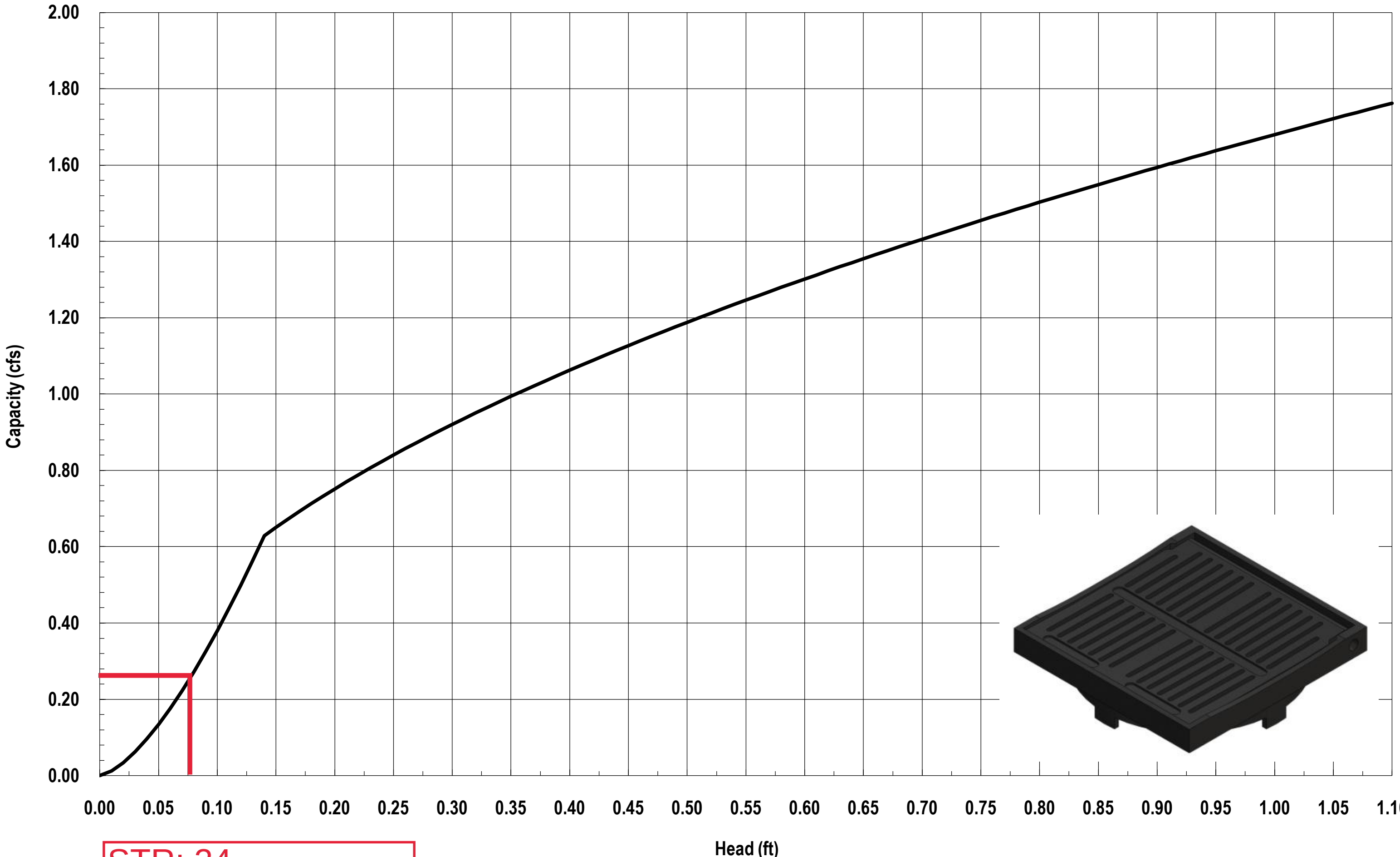
Nyloplast 12" Pedestrian Grate Inlet Capacity Chart



STR: 24
10-YR CFS: 0.26
HEAD: 0.075 FT

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APPENDIX A: SOIL MAPS & SOIL DESCRIPTIONS

United States Department of Agriculture

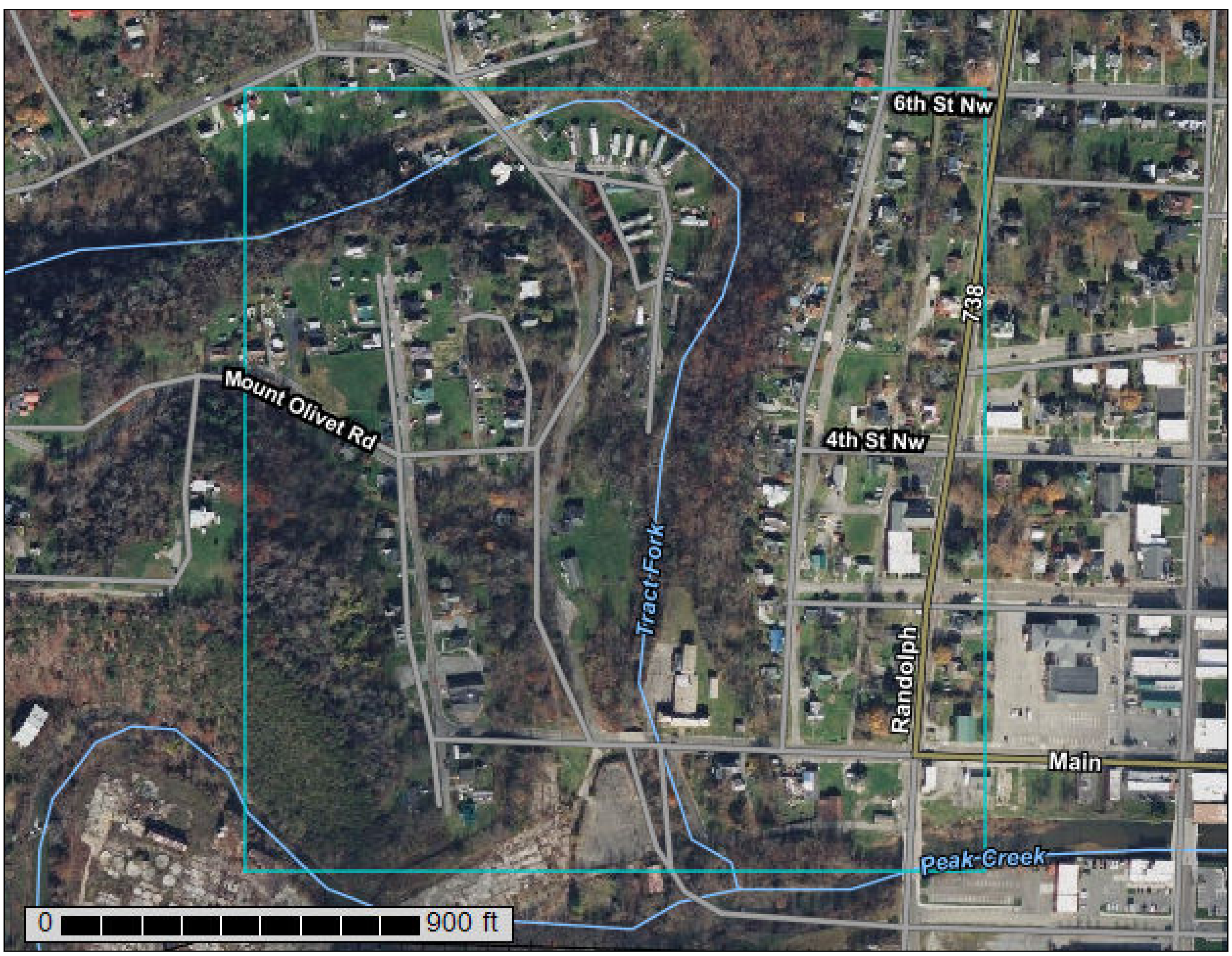
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Pulaski County, Virginia



February 10, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

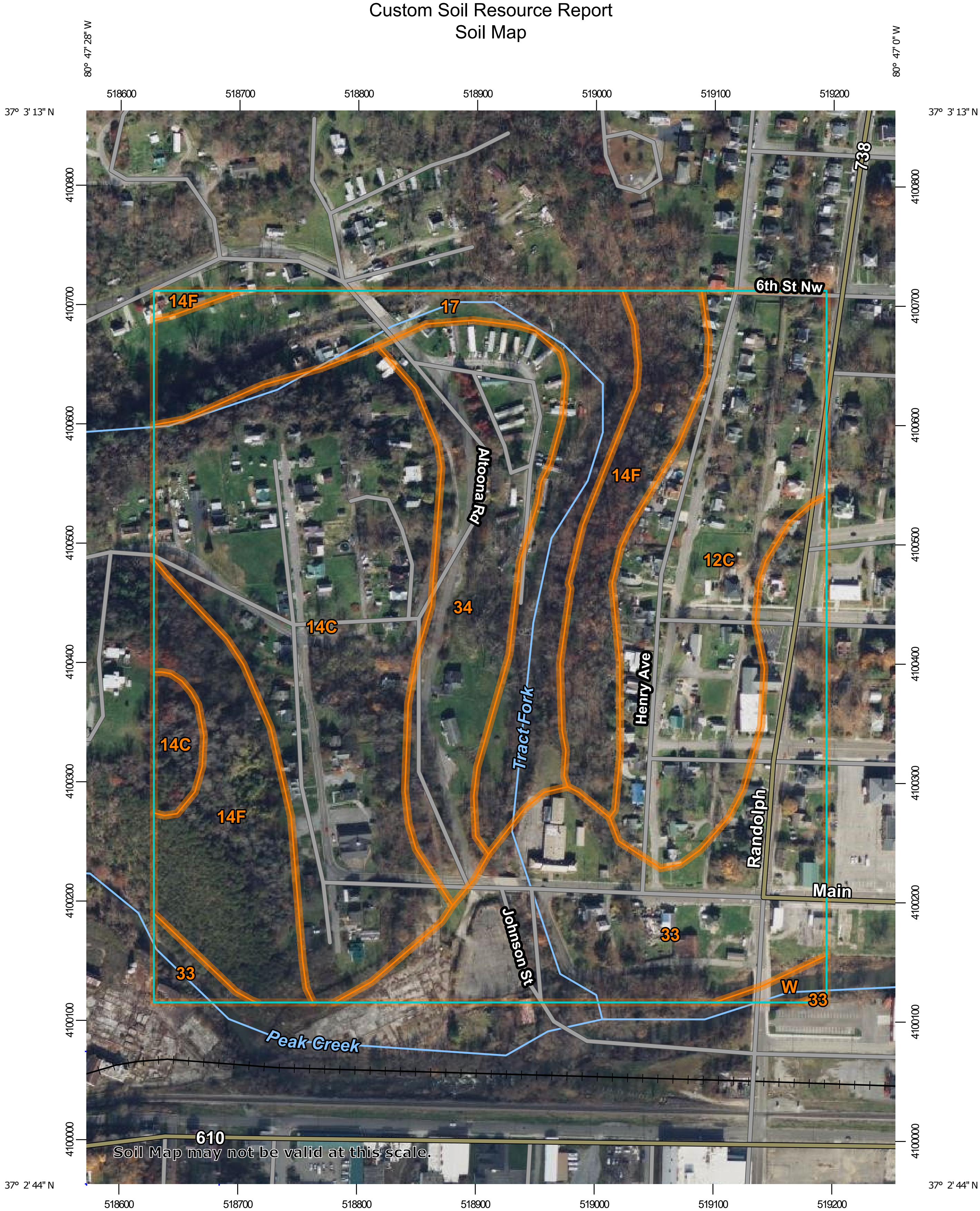
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:4,390 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pulaski County, Virginia
Survey Area Data: Version 17, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 14, 2020—Nov 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12C	Groseclose-Urban land complex, 7 to 15 percent slopes	13.6	16.2%
14C	Klinesville-Berks channery silt loams, 7 to 15 percent slopes	21.2	25.3%
14F	Klinesville-Berks channery silt loams, 30 to 65 percent slopes	12.3	14.7%
17	Lindside-Nolin silt loams	10.8	12.8%
33	Urban land	16.0	19.1%
34	Wheeling sandy loam	9.5	11.4%
W	Water	0.4	0.5%
Totals for Area of Interest		**83.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pulaski County, Virginia

12C—Groseclose-Urban land complex, 7 to 15 percent slopes

Map Unit Setting

National map unit symbol: khd7
Elevation: 1,000 to 2,600 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Groseclose and similar soils: 60 percent
Urban land: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Groseclose

Setting

Landform: Hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and shale

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 62 inches: clay
H3 - 62 to 67 inches: silty clay loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F128XY516WV - Mesic Limestone With Interbedded Sedimentary Uplands
Hydric soil rating: No

14C—Klinesville-Berks channery silt loams, 7 to 15 percent slopes

Map Unit Setting

National map unit symbol: khdc
Elevation: 300 to 1,500 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Klinesville and similar soils: 55 percent
Berks and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klinesville

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 2 inches: channery silt loam
H2 - 2 to 14 inches: very channery silt loam
H3 - 14 to 24 inches: bedrock

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F128XY514WV - Mesic Interbedded Sedimentary Uplands
Hydric soil rating: No

Description of Berks

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 27 inches: very channery silt loam
H3 - 27 to 31 inches: bedrock

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F128XY514WV - Mesic Interbedded Sedimentary Uplands
Hydric soil rating: No

14F—Klinesville-Berks channery silt loams, 30 to 65 percent slopes

Map Unit Setting

National map unit symbol: khdd
Elevation: 300 to 1,500 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Klinesville and similar soils: 55 percent
Berks and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klinesville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 2 inches: channery silt loam
H2 - 2 to 14 inches: very channery silt loam
H3 - 14 to 24 inches: bedrock

Properties and qualities

Slope: 30 to 65 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F128XY514WV - Mesic Interbedded Sedimentary Uplands
Hydric soil rating: No

Description of Berks

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 27 inches: very channery silt loam
H3 - 27 to 31 inches: bedrock

Properties and qualities

Slope: 30 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 5.95 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F128XY514WV - Mesic Interbedded Sedimentary Uplands
Hydric soil rating: No

17—Lindside-Nolin silt loams

Map Unit Setting

National map unit symbol: khdk
Elevation: 300 to 1,500 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Lindside and similar soils: 55 percent
Nolin and similar soils: 40 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindside

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 38 inches: silt loam
H3 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F128XY519WV - Mesic Floodplain Alluvium
Hydric soil rating: No

Description of Nolin

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 38 inches: silt loam
H3 - 38 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Ecological site: F128XY519WV - Mesic Floodplain Alluvium
Hydric soil rating: No

Minor Components

Dunning

Percent of map unit: 3 percent
Landform: Depressions on flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

33—Urban land

Map Unit Setting

National map unit symbol: khfp
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

34—Wheeling sandy loam

Map Unit Setting

National map unit symbol: khfq
Elevation: 1,640 to 2,250 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wheeling and similar soils: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wheeling

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 52 inches: sandy clay loam
H3 - 52 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F128XY521WV - Mesic Low Stream Terrace Alluvium
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: khg7
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Perenial streams, lakes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.

Map—K Factor, Whole Soil

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Pulaski County, Virginia
Survey Area Data: Version 17, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 14, 2020—Nov 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12C	Groseclose-Urban land complex, 7 to 15 percent slopes	.37	13.6	16.2%
14C	Klinesville-Berks channery silt loams, 7 to 15 percent slopes	.17	21.2	25.3%
14F	Klinesville-Berks channery silt loams, 30 to 65 percent slopes	.17	12.3	14.7%
17	Lindside-Nolin silt loams	.37	10.8	12.8%
33	Urban land		16.0	19.1%
34	Wheeling sandy loam	.15	9.5	11.4%
W	Water		0.4	0.5%
Totals for Area of Interest			**83.8**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Soil Health Properties

Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. This folder contains information on soil properties that are important indicators of soil health.

Soil Health - Soil Reaction (pH)

Soil reaction (pH) is a measure of acidity or alkalinity. Chemically, it is a measurement of the hydrogen ion activity [H+] in the soil solution. The pH scale ranges from 0 to 14; a pH of 7 is considered neutral. If pH values are greater than 7, the solution is considered basic or alkaline; if they are below 7, the solution is acidic.

Significance:

The acidity or alkalinity of a soil affects the availability of plant nutrients, the activity of microorganisms, and the solubility of soil minerals (Brady, 1990). In general, pH values between 6 and 7.5 are optimum for general crop growth. Site-specific interpretations for soil health will depend on specific land uses and crop tolerances. In acid soils, calcium and magnesium, nitrate-nitrogen, phosphorus, boron, and molybdenum are deficient but aluminum and manganese are abundant, in some cases at levels toxic to some plants (USDA-NRCS, 2008). Phosphorus, iron, copper, zinc, and boron are frequently deficient in very alkaline soils. Bacterial populations and activity decline at low pH levels, whereas fungi adapt to a large range of pH (acidic and alkaline). Nitrification and nitrogen fixation are also inhibited by low pH (USDA-NRCS, 2008). To increase pH, liming, adding organic residues rich in basic cations, and rotating crops to interrupt the acidifying effect of leguminous crops are effective. Applying ammonium-based fertilizers, urea, sulfur, or ferrous sulfate; irrigating with acidifying fertilizers; or using acidifying residues (acid moss, pine needles, sawdust) decrease soil pH (USDA-NRCS, 2008).

Factors Affecting Soil Reaction:

Inherent factors.—The natural soil pH reflects the combined effects of climate, vegetation, topography, parent material, and time. Temperature and rainfall are two major factors that control the intensity of leaching and soil mineral weathering. Acidity is generally associated with leached soils, and alkalinity is generally associated with soils in drier regions. In arid climates, soil weathering and leaching are less intense, cations accumulate, and the soil becomes neutral or alkaline. In soils where the pH is less than 5, aluminum becomes soluble and reacts with water to produce hydrogen ions. Sandy soils may acidify more easily compared to clay soils because they have a low buffering capacity and tend to leach more readily. Vegetation has an effect on soil pH through the type of organic matter that is added; certain types of vegetation are soil acidifying (USDA-NRCS, 2008).

Dynamic factors.—The conversion of uncultivated land into cropland can result in drastic pH changes after a few years. These changes are caused by the removal of cations by crops, the acceleration of leaching, the effect of fertilizers and amendments, and the variations in organic matter content and soil buffering capacity (USDA-NRCS, 2008). Inorganic amendments (lime and gypsum) and organic amendments rich in cations increase soil pH. Ammonium from organic matter mineralization (nitrification), ammonium-based fertilizers, and sulfur compounds lower the pH. High rates of water percolation and infiltration can increase the leaching of cations and accelerate soil acidification.

Measurement:

The pH reported here is measured using the 1:1 soil to water ratio method (Soil Survey Staff, 2014). A crushed soil sample is mixed with an equal amount of water, and the pH of the suspension is measured.

References:

Brady, N.C. 1990. The nature and properties of soils. 10th ed. Macmillan Publishers, NY.

Smith, J.L., and J.W. Doran. 1996. Measurement and use of pH and electrical conductivity for soil quality analysis. In: J.W. Doran and A.J. Jones (eds.) Methods for Assessing Soil Quality. Soil Science Society of America Special Publication 49:169-185.

Soil Survey Staff. 2014. Kellogg Soil Survey Laboratory methods manual. Soil Survey Investigations Report No. 42, Version 5.0. R. Burt and Soil Survey Staff (eds.). U.S. Department of Agriculture, Natural Resources Conservation Service.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2008. Soil quality indicators—Soil pH.

Map—Soil Health - Soil Reaction (pH)

Map Scale: 1:4,390 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Soil Rating Lines

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Soil Rating Points

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pulaski County, Virginia
Survey Area Data: Version 17, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 14, 2020—Nov 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Soil Health - Soil Reaction (pH)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12C	Groseclose-Urban land complex, 7 to 15 percent slopes	4.6	13.6	16.2%
14C	Klinesville-Berks channery silt loams, 7 to 15 percent slopes	5.3	21.2	25.3%
14F	Klinesville-Berks channery silt loams, 30 to 65 percent slopes	5.3	12.3	14.7%
17	Lindside-Nolin silt loams	6.5	10.8	12.8%
33	Urban land		16.0	19.1%
34	Wheeling sandy loam	5.8	9.5	11.4%
W	Water		0.4	0.5%
Totals for Area of Interest			**83.8**	**100.0%**

Rating Options—Soil Health - Soil Reaction (pH)

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group

Map Scale: 1:4,390 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pulaski County, Virginia
Survey Area Data: Version 17, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 14, 2020—Nov 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12C	Groseclose-Urban land complex, 7 to 15 percent slopes	C	13.6	16.2%
14C	Klinesville-Berks channery silt loams, 7 to 15 percent slopes	D	21.2	25.3%
14F	Klinesville-Berks channery silt loams, 30 to 65 percent slopes	D	12.3	14.7%
17	Lindside-Nolin silt loams	C	10.8	12.8%
33	Urban land		16.0	19.1%
34	Wheeling sandy loam	B	9.5	11.4%
W	Water		0.4	0.5%
Totals for Area of Interest			**83.8**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B: STORMWATER CONVEYANCE AND WATER QUANTITY CALCULATIONS

BALZER
& ASSOCIATES

SS2

FROM POINT	TO POINT	DA (ACRES)	C	CA INCR.	ACCUM.	T_C (MINUTES)	RAINFALL (IN/HR)	RUNOFF (CFS)	LINE	INVERT IN	INVERT OUT	LENGTH (FEET)	SLOPE	DIAM. (INCHES)	MANNING'S N COEFF.	CAPACITY (CFS)	VELOCITY (FPS)	FLOW TIME (MINUTES)	PERCENT CAPACITY
1	3					5.00	4.03		2	1912.62	1912.03	117.42	0.50%	8	0.012	0.93			
3	5	0.10	0.85	0.08	0.08	5.00	4.03	0.33	4	1912.03	1911.64	59.59	0.67%	12	0.012	3.16	2.61	0.38	0.10
5	7	0.08	0.69	0.06	0.14	5.38	3.95	0.55	6	1911.64	1911.48	10.88	1.42%	12	0.012	4.60	3.96	0.05	0.12
7	9	0.01	0.90	0.01	0.15	5.43	3.94	0.59	8	1911.48	1909.39	57.55	3.64%	15	0.012	13.35	5.46	0.18	0.04
9	X3 OUT	0.00	0.90	0.00	1.18	7.56	3.58	4.23	X3	1909.38	1908.75	29.79	2.12%	18	0.024	8.28	4.72	0.11	0.51
X1	9	0.92	0.64	0.59	0.59	5.00	4.03	2.36	X2	1910.86	1909.38	69.88	2.12%	18	0.024	8.28	4.05	0.29	0.29
10	12	0.04	0.72	0.03	0.03	5.00	4.03	0.13	11	1912.80	1912.61	38.99	0.50%	12	0.012	2.73	1.78	0.37	0.05
12	14	0.04	0.56	0.02	0.05	5.37	3.95	0.21	13	1912.61	1912.36	48.75	0.50%	12	0.012	2.73	2.06	0.39	0.08
14	16	0.16	0.59	0.09	0.14	5.76	3.88	0.56	15	1912.36	1911.23	113.29	1.00%	12	0.012	3.86	3.51	0.54	0.15
16	18				0.14	6.30	3.78	0.56	17	1911.23	1910.69	53.71	1.00%	12	0.012	3.86	3.51	0.26	0.15
18	20	0.24	0.57	0.14	0.28	6.55	3.74	1.05	19	1910.69	1910.54	30.48	0.50%	12	0.012	2.73	3.25	0.16	0.38
20	22	0.14	0.67	0.10	0.38	6.71	3.71	1.40	21	1910.44	1910.24	40.15	0.50%	12	0.012	2.73	3.50	0.19	0.51
22	24	0.04	0.44	0.02	0.40	6.90	3.68	1.46	23	1910.24	1909.62	123.68	0.50%	12	0.012	2.73	3.54	0.58	0.53
24	9	0.07	0.64	0.05	0.44	7.48	3.59	1.59	25	1909.62	1909.48	19.96	0.70%	15	0.012	5.85	4.07	0.08	0.27

BALZER
& ASSOCIATES

HGL2

LD-347

INLET	OUTLET WATER SURFACE ELEV.	D_o	Q_o	L_o	S_{fo}	H_f	JUNCTION LOSS												FINAL H	INLET WATER SURFACE ELEV.	RIM ELEV.
							V_o	H_o	Q_i	V_i	$Q_iV_{i,max}$	$V_i^2/2g$	H_i	ANGLE	H_Δ	H_t	$1.3H_t$	$0.5H_t$			
9	1909.95	18''	4.23	29.79	0.55	0.16	4.72	0.09	2.36	4.05	9.58	0.25	0.09	90	0.32	0.50		0.25	0.41	1910.36	1916.19
7	1910.39	15''	0.59	57.55	0.01	0.00	5.46	0.12	0.55	3.96	2.19	0.24	0.09	80	0.16	0.36		0.18	0.19	1910.58	1915.38
5	1912.28	12''	0.55	10.88	0.02	0.00	3.96	0.06	0.33	2.61	0.86	0.11	0.04	75	0.07	0.17	0.22	0.11	0.11	1912.39	1917.92
3	1912.44	12''	0.33	59.59	0.01	0.00	2.61	0.03								0.03	0.03	0.02	0.02	1912.46	1917.92
1	1912.56	8''	0.00	117.42	0.00	0.00													0.00	1912.56	1915.62
X1	1910.58	18''	2.36	69.88	0.17	0.12	4.05	0.08								0.08	0.10	0.05	0.17	1910.75	1915.29
24	1910.48	15''	1.59	19.96	0.05	0.01	4.07	0.06	1.46	3.54	5.15	0.19	0.07	28	0.06	0.20		0.10	0.11	1910.59	1915.80
22	1910.59	12''	1.46	123.68	0.14	0.18	3.54	0.05	1.40	3.50	4.90	0.19	0.07	22	0.05	0.17		0.08	0.26	1910.85	1915.73
20	1911.04	12''	1.40	40.15	0.13	0.05	3.50	0.05	1.05	3.25	3.40	0.16	0.06	82	0.11	0.22	0.28	0.14	0.19	1911.23	1915.85
18	1911.34	12''	1.05	30.48	0.07	0.02	3.25	0.04	0.56	3.51	1.96	0.19	0.07	76	0.12	0.23	0.30	0.15	0.17	1911.51	1915.67
16	1911.51	12''	0.56	53.71	0.02	0.01	3.51	0.05	0.56	3.51	1.96	0.19	0.07	90	0.13	0.25		0.12	0.14	1911.65	1917.35
14	1912.03	12''	0.56	113.29	0.02	0.02	3.51	0.05	0.21	2.06	0.44	0.07	0.02			0.07	0.09	0.05	0.07	1912.10	1915.50
12	1913.16	12''	0.21	48.75	0.00	0.00	2.06	0.02	0.13	1.78	0.23	0.05	0.02	63	0.03	0.06	0.08	0.04	0.04	1913.20	1915.69
10	1913.41	12''	0.13	38.99	0.00	0.00	1.78	0.01								0.01	0.02	0.01	0.01	1913.42	1915.80

BALZER
& ASSOCIATES

SS10

FROM POINT	TO POINT	DA (ACRES)	C	CA INCR.	ACCUM.	T_c (MINUTES)	RAINFALL (IN/HR)	RUNOFF (CFS)	LINE	INVERT IN	INVERT OUT	LENGTH (FEET)	SLOPE	DIAM. (INCHES)	MANNING'S N COEFF.	CAPACITY (CFS)	VELOCITY (FPS)	FLOW TIME (MINUTES)	PERCENT CAPACITY
1	3					5.00	5.36		2	1912.62	1912.03	117.42	0.50%	8	0.012	0.93			
3	5	0.10	0.85	0.08	0.08	5.00	5.36	0.44	4	1912.03	1911.64	59.59	0.67%	12	0.012	3.16	2.84	0.35	0.14
5	7	0.08	0.69	0.06	0.14	5.35	5.28	0.74	6	1911.64	1911.48	10.88	1.42%	12	0.012	4.60	4.30	0.04	0.16
7	9	0.01	0.90	0.01	0.15	5.39	5.27	0.78	8	1911.48	1909.39	57.55	3.64%	15	0.012	13.35	5.96	0.16	0.06
9	X3 OUT	0.00	0.90	0.00	1.18	7.37	4.83	5.71	X3	1909.38	1908.75	29.79	2.12%	18	0.024	8.28	5.07	0.10	0.69
X1	9	0.92	0.64	0.59	0.59	5.00	5.36	3.15	X2	1910.86	1909.38	69.88	2.12%	18	0.024	8.28	4.38	0.27	0.38
10	12	0.04	0.72	0.03	0.03	5.00	5.36	0.17	11	1912.80	1912.61	38.99	0.50%	12	0.012	2.73	1.94	0.34	0.06
12	14	0.04	0.56	0.02	0.05	5.34	5.28	0.28	13	1912.61	1912.36	48.75	0.50%	12	0.012	2.73	2.25	0.36	0.10
14	16	0.16	0.59	0.09	0.14	5.70	5.19	0.75	15	1912.36	1911.23	113.29	1.00%	12	0.012	3.86	3.81	0.50	0.19
16	18				0.14	6.19	5.08	0.75	17	1911.23	1910.69	53.71	1.00%	12	0.012	3.86	3.81	0.23	0.19
18	20	0.24	0.57	0.14	0.28	6.43	5.03	1.41	19	1910.69	1910.54	30.48	0.50%	12	0.012	2.73	3.51	0.14	0.52
20	22	0.14	0.67	0.10	0.38	6.57	5.00	1.88	21	1910.44	1910.24	40.15	0.50%	12	0.012	2.73	3.76	0.18	0.69
22	24	0.04	0.44	0.02	0.40	6.75	4.96	1.96	23	1910.24	1909.62	123.68	0.50%	12	0.012	2.73	3.79	0.54	0.72
24	9	0.07	0.64	0.05	0.44	7.29	4.84	2.15	25	1909.62	1909.48	19.96	0.70%	15	0.012	5.85	4.41	0.08	0.37

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HGL10

INLET	OUTLET WATER SURFACE ELEV.	D_o	Q_o	L_o	S_{fo}	H_f	JUNCTION LOSS												FINAL H	INLET WATER SURFACE ELEV.	RIM ELEV.
							V_o	H_o	Q_i	V_i	$Q_iV_{i,max}$	$V_i^2/2g$	H_i	ANGLE	H_Δ	H_t	$1.3H_t$	$0.5H_t$			
9	1909.95	18''	5.71	29.79	1.01	0.30	5.07	0.10	3.15	4.38	13.79	0.30	0.10	90	0.39	0.59		0.29	0.60	1910.55	1916.19
7	1910.55	15''	0.78	57.55	0.01	0.01	5.96	0.14	0.74	4.30	3.18	0.29	0.10	80	0.19	0.43		0.22	0.22	1910.77	1915.38
5	1912.28	12''	0.74	10.88	0.04	0.00	4.30	0.07	0.44	2.84	1.25	0.12	0.04	75	0.08	0.20	0.25	0.13	0.13	1912.41	1917.92
3	1912.44	12''	0.44	59.59	0.01	0.01	2.84	0.03								0.03	0.04	0.02	0.03	1912.47	1917.92
1	1912.56	8''	0.00	117.42	0.00	0.00													0.00	1912.56	1915.62
X1	1910.58	18''	3.15	69.88	0.31	0.21	4.38	0.09								0.09	0.12	0.06	0.27	1910.85	1915.29
24	1910.55	15''	2.15	19.96	0.09	0.02	4.41	0.08	1.96	3.79	7.43	0.22	0.08	28	0.07	0.23		0.11	0.13	1910.68	1915.80
22	1910.68	12''	1.96	123.68	0.26	0.32	3.79	0.06	1.88	3.76	7.06	0.22	0.08	22	0.06	0.19		0.10	0.42	1911.09	1915.73
20	1911.09	12''	1.88	40.15	0.24	0.10	3.76	0.05	1.41	3.51	4.94	0.19	0.07	82	0.13	0.25	0.33	0.16	0.26	1911.35	1915.85
18	1911.35	12''	1.41	30.48	0.13	0.04	3.51	0.05	0.75	3.81	2.85	0.23	0.08	76	0.15	0.27	0.35	0.18	0.22	1911.57	1915.67
16	1911.57	12''	0.75	53.71	0.04	0.02	3.81	0.06	0.75	3.81	2.85	0.23	0.08	90	0.16	0.29		0.15	0.17	1911.74	1917.35
14	1912.03	12''	0.75	113.29	0.04	0.04	3.81	0.06	0.28	2.25	0.63	0.08	0.03			0.08	0.11	0.05	0.10	1912.13	1915.50
12	1913.16	12''	0.28	48.75	0.01	0.00	2.25	0.02	0.17	1.94	0.33	0.06	0.02	63	0.03	0.07	0.10	0.05	0.05	1913.21	1915.69
10	1913.41	12''	0.17	38.99	0.00	0.00	1.94	0.02								0.02	0.02	0.01	0.01	1913.42	1915.80

STORMWATER INLET COMPUTATIONS SHEET

LD-204

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INLET				ALL INLETS											
NUMBER	TYPE	CURB TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	ΣCA	I (IN/HR)	Q INCR. (CFS)	Qc, CARRYOVER (CFS)	Q_T, GUTTER FLOW (CFS)	S, GUTTER SLOPE (FT/FT)	S_X, CROSS SLOPE (FT/FT)	T, SPREAD (FT)
(1)	(2)	(2A)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
X1	GRADE	CG-6	4					0.59	4	2.35	0.00	2.35	0.005	0.02083	9.74

	GRADE INLETS													
NUMBER	W, GUTTER WIDTH (FT)	W/T	S_W, GUTTER SLOPE (FT/FT)	S_W/S_X	E_O (CFS/CFS)	a (FT)	S'_W (IN/IN)	S_e (FT/FT)	L_T, COMPUTED LENGTH (FT)	L, SPECIFIED LENGTH (FT)	L/L_T	E, EFFICIENCY	Qi, INTERCEPTED (CFS)	Qb, CARRYOVER (CFS)
(1)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
X1	2.0	0.21	0.08333	4.00	0.59	0.3	0.14583	0.10617	8.4	4.0	0.478	0.69	1.62	0.73

	SAG INLETS			
NUMBER	d (FT)	h (FT)	d/h	T, SPREAD @ SAG (FT)
(1)	(30)	(31)	(32)	(33)
X1				

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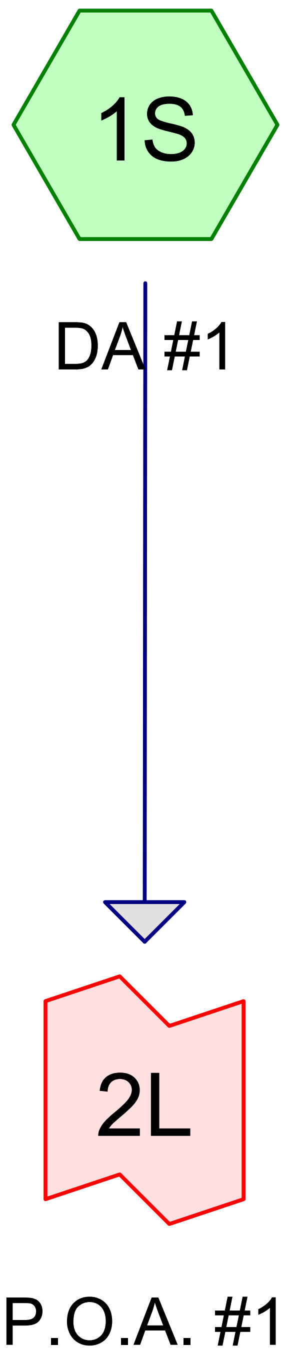
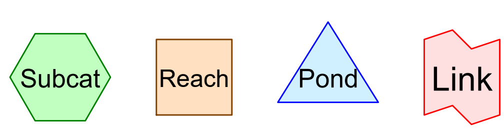
STORMWATER INLET COMPUTATIONS SHEET

INLET				ALL INLETS												GRADE INLETS														SAG INLETS			
NUMBER	TYPE	CURB TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	ΣCA	I (IN/HR)	Q INCR. (CFS)	Qc, CARRYOVER (CFS)	Q_T, GUTTER FLOW (CFS)	S, GUTTER SLOPE (FT/FT)	S_x, CROSS SLOPE (FT/FT)	T, SPREAD (FT)	W, GUTTER WIDTH (FT)	W/T	S_W, GUTTER SLOPE (FT/FT)	S_W/S_X	E_O (CFS/CFS)	a (FT)	S'_W (IN/IN)	S_e (FT/FT)	L_T, COMPUTED LENGTH (FT)	L, SPECIFIED LENGTH (FT)	L/L_T	E, EFFICIENCY	Qi, INTERCEPTED (CFS)	Qb, CARRYOVER (CFS)	d (FT)	h (FT)	d/h	T, SPREAD @ SAG (FT)
(1)	(2)	(2A)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
X1	GRADE	CG-6	4					0.59	6.5	3.82	0.00	3.82	0.005	0.02083	12.07	2.0	0.17	0.08333	4.00	0.48	0.3	0.14583	0.09144	11.2	4.0	0.357	0.55	2.09	1.73				





Routing Diagram for PRE-DEVELOPMENT
Prepared by Balzer & Associates, Inc, Printed 2/15/2023
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Project Notes

Copied 7 events from VA-RAFORD NOAA storm
Copied 10 events from VA-Town_Pulaski 24-hr S1 storm

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	VA-Town_Pulaski 24-hr S1	1-yr	Default	24.00	1	1.96	2
2	2-yr	VA-Town_Pulaski 24-hr S1	2-yr	Default	24.00	1	2.37	2
3	10-yr	VA-Town_Pulaski 24-hr S1	10-yr	Default	24.00	1	3.49	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.612	74	>75% Grass cover, Good, HSG C (1S)
0.293	98	Paved parking, HSG C (1S)
0.905	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.905	HSG C	1S
0.000	HSG D	
0.000	Other	
0.905		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.612	0.000	0.000	0.612	>75% Grass cover, Good	1S
0.000	0.000	0.293	0.000	0.000	0.293	Paved parking	1S
0.000	**0.000**	**0.905**	**0.000**	**0.000**	**0.905**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=0.79"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=0.65 cfs 0.059 af

Link 2L: P.O.A. #1 Inflow=0.65 cfs 0.059 af
Primary=0.65 cfs 0.059 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.059 af Average Runoff Depth = 0.79"

Summary for Subcatchment 1S: DA #1

measured Tc from middle of site (high point) to edge of DA.

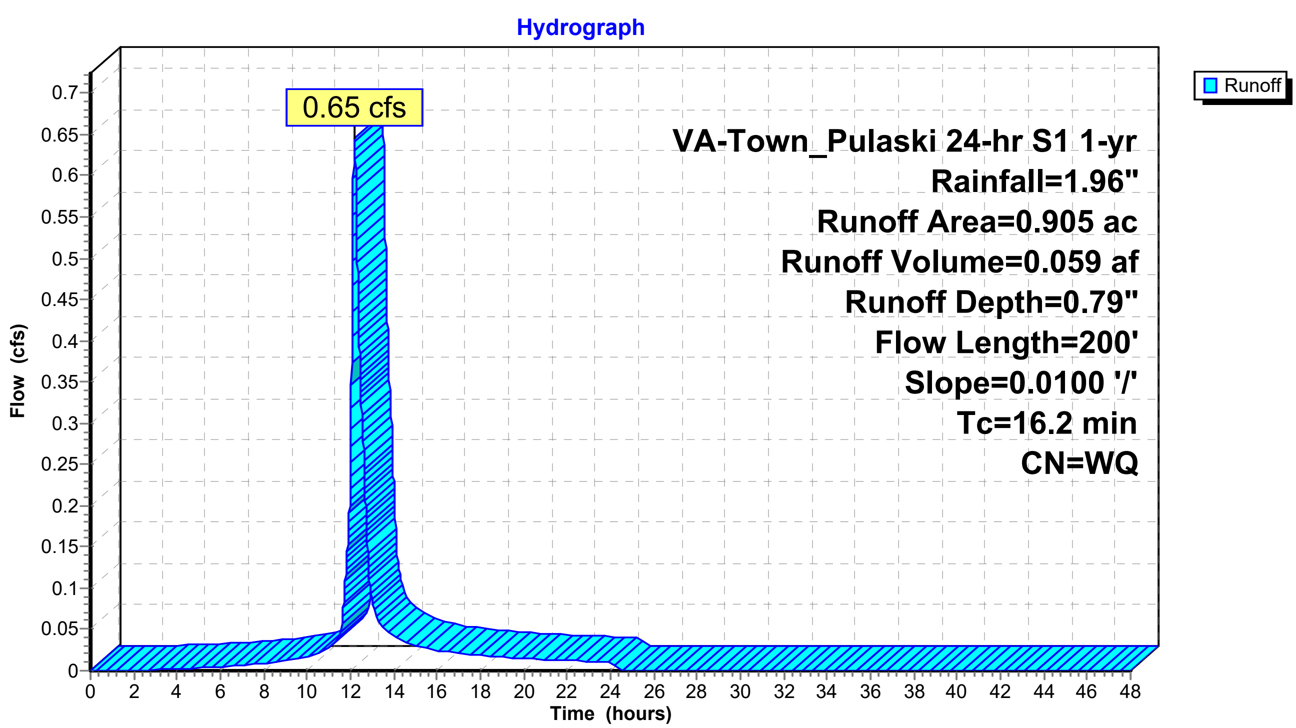
Runoff = 0.65 cfs @ 12.19 hrs, Volume= 0.059 af, Depth= 0.79"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 1-yr Rainfall=1.96"

Area (ac)	CN	Description
0.293	98	Paved parking, HSG C
0.612	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC1 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC2 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

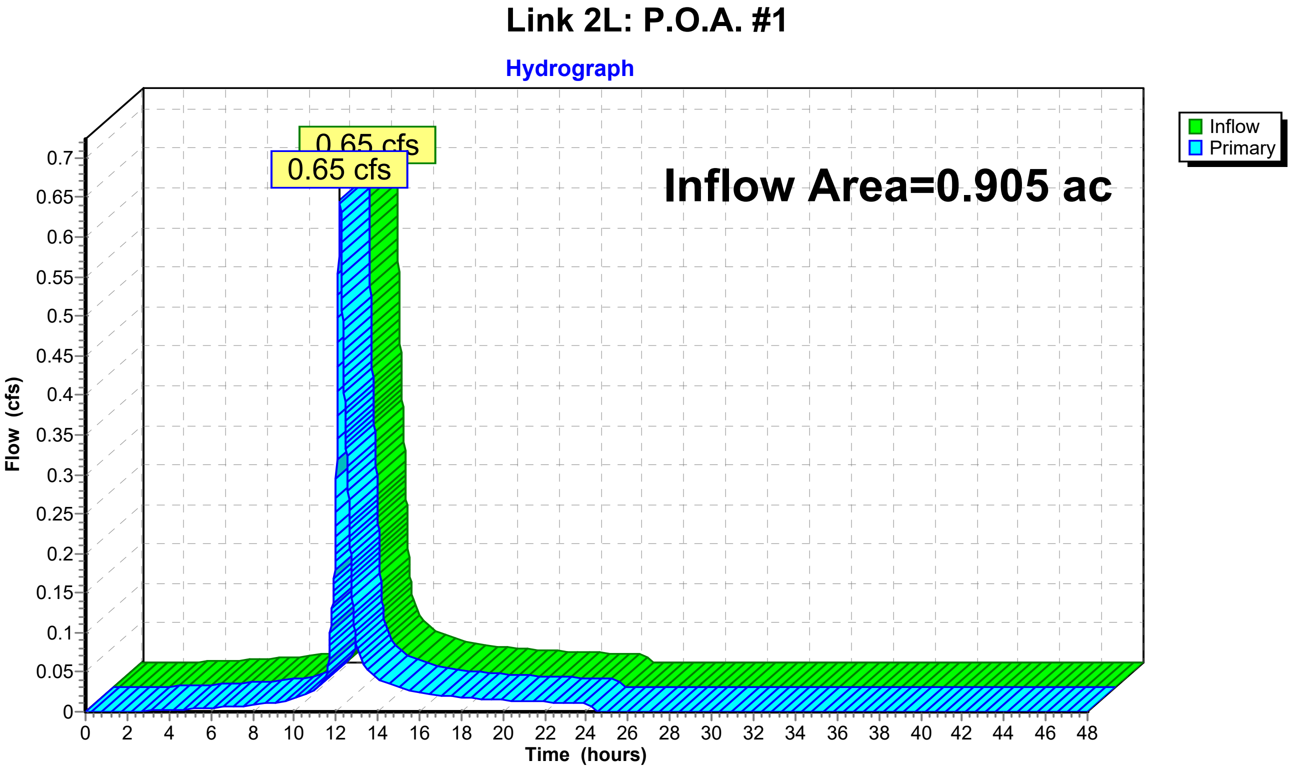
Subcatchment 1S: DA #1



Summary for Link 2L: P.O.A. #1

Inflow Area = 0.905 ac, Inflow Depth = 0.79" for 1-yr event
Inflow = 0.65 cfs @ 12.19 hrs, Volume= 0.059 af
Primary = 0.65 cfs @ 12.19 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=1.06"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=0.89 cfs 0.080 af

Link 2L: P.O.A. #1 Inflow=0.89 cfs 0.080 af
Primary=0.89 cfs 0.080 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.080 af Average Runoff Depth = 1.06"

Summary for Subcatchment 1S: DA #1

measured Tc from middle of site (high point) to edge of DA.

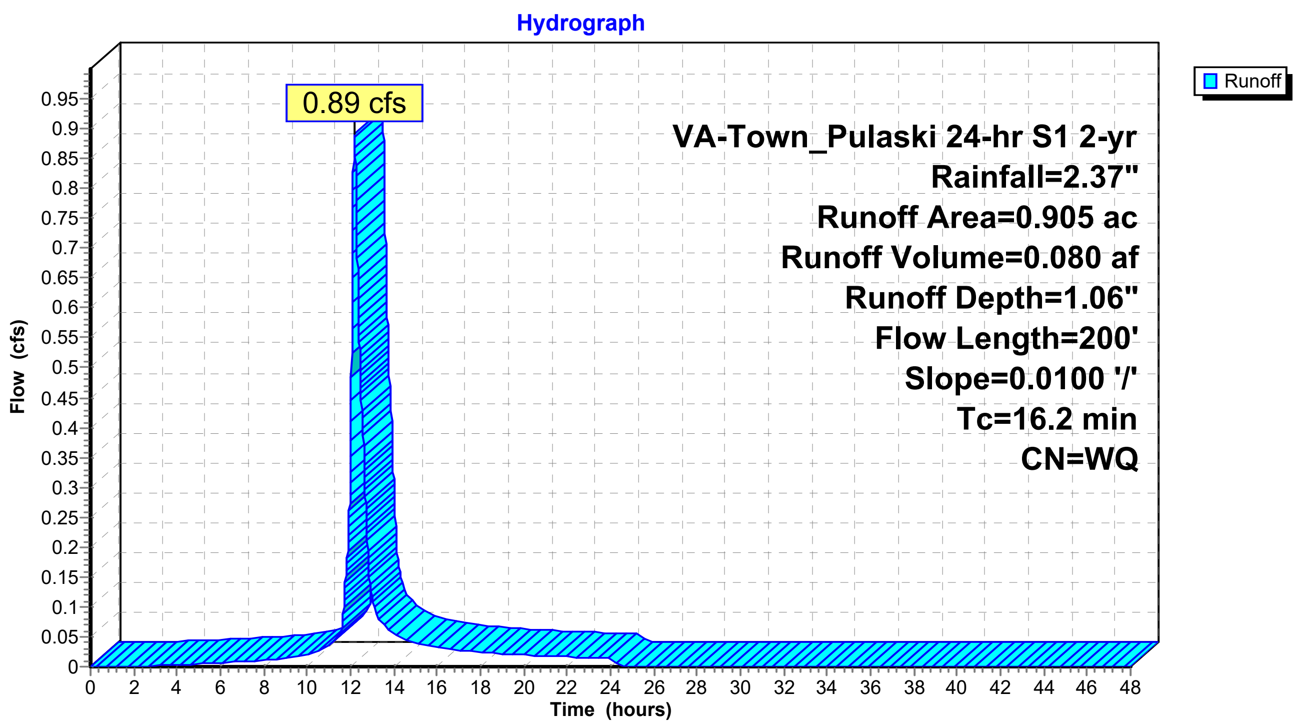
Runoff = 0.89 cfs @ 12.19 hrs, Volume= 0.080 af, Depth= 1.06"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 2-yr Rainfall=2.37"

Area (ac)	CN	Description
0.293	98	Paved parking, HSG C
0.612	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC1 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC2 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

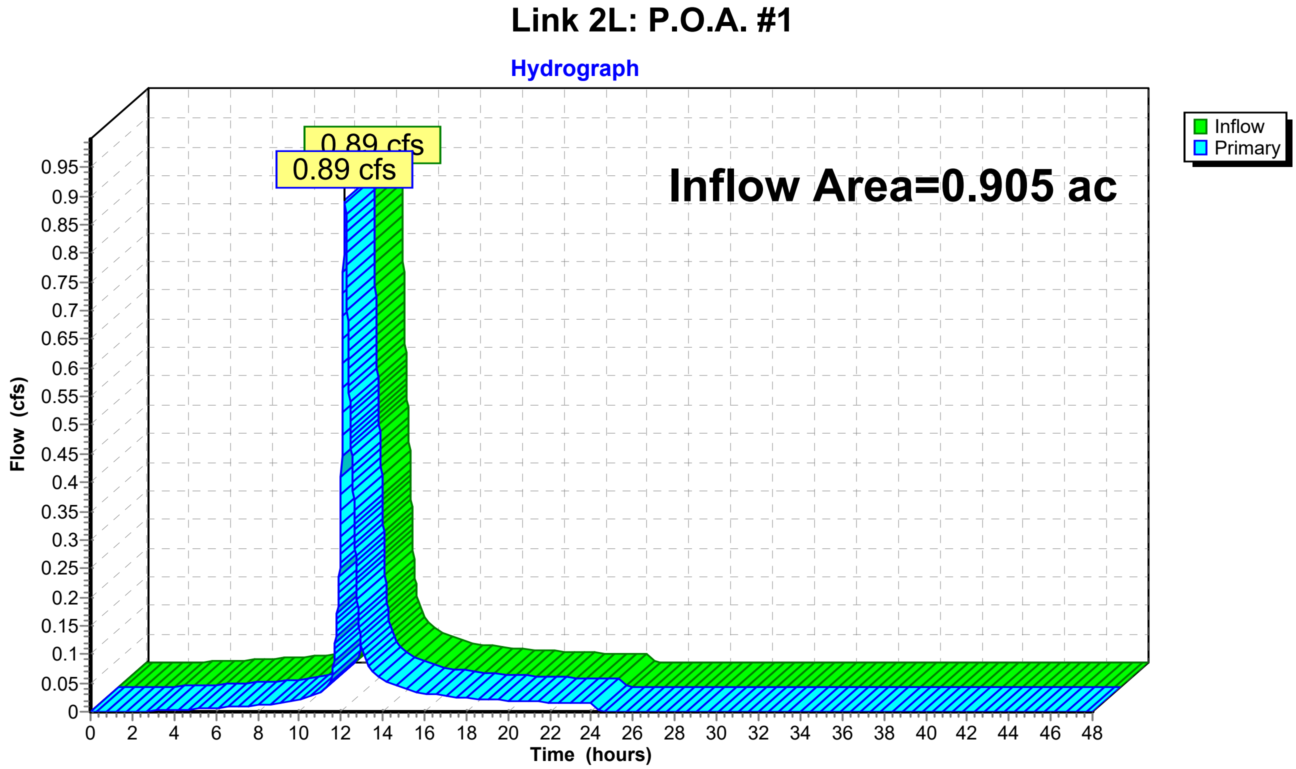
Subcatchment 1S: DA #1



Summary for Link 2L: P.O.A. #1

Inflow Area = 0.905 ac, Inflow Depth = 1.06" for 2-yr event
Inflow = 0.89 cfs @ 12.19 hrs, Volume= 0.080 af
Primary = 0.89 cfs @ 12.19 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=1.89"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=1.61 cfs 0.142 af

Link 2L: P.O.A. #1 Inflow=1.61 cfs 0.142 af
Primary=1.61 cfs 0.142 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.142 af Average Runoff Depth = 1.89"

Summary for Subcatchment 1S: DA #1

measured Tc from middle of site (high point) to edge of DA.

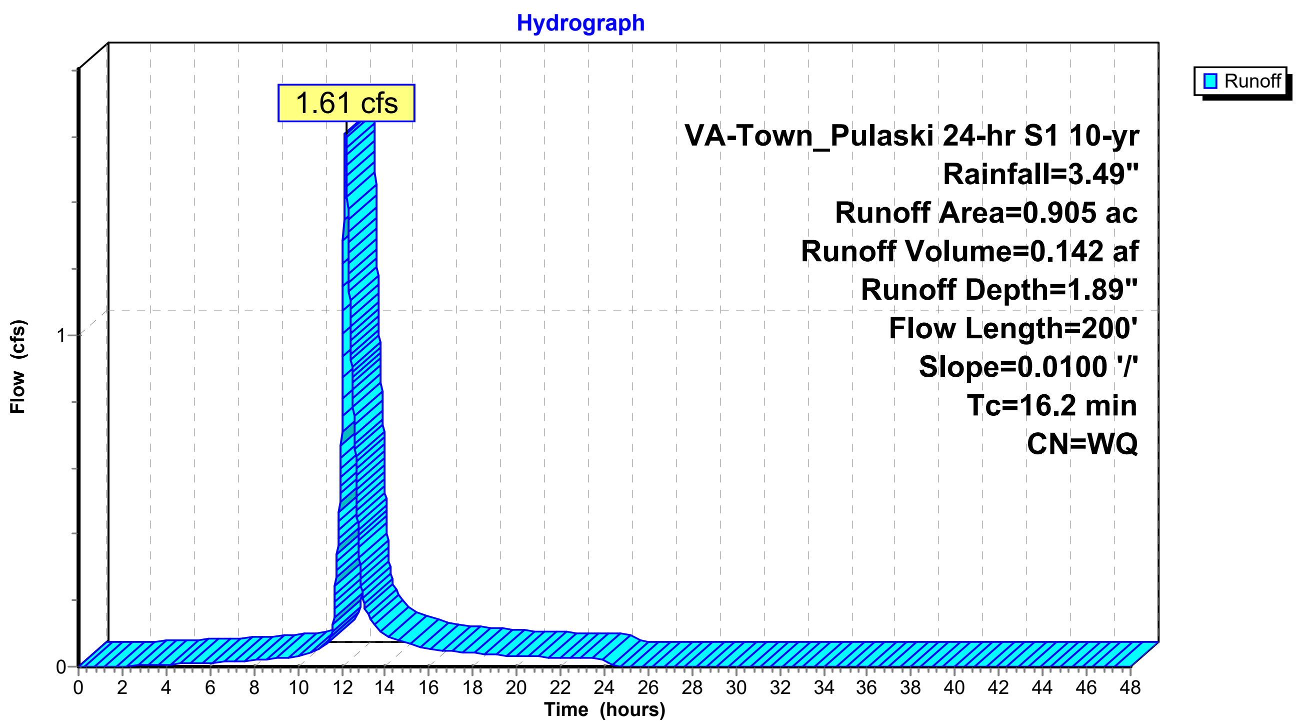
Runoff = 1.61 cfs @ 12.18 hrs, Volume= 0.142 af, Depth= 1.89"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 10-yr Rainfall=3.49"

Area (ac)	CN	Description
0.293	98	Paved parking, HSG C
0.612	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC1 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC2 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

Subcatchment 1S: DA #1

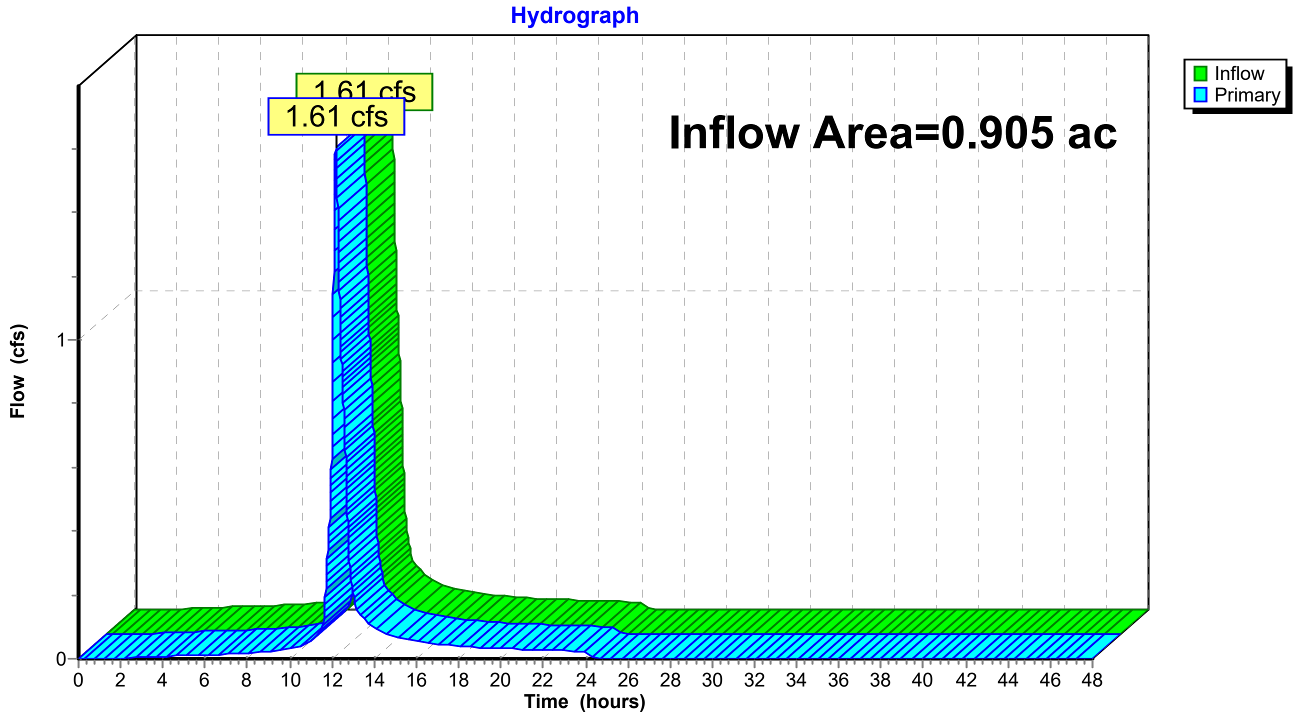


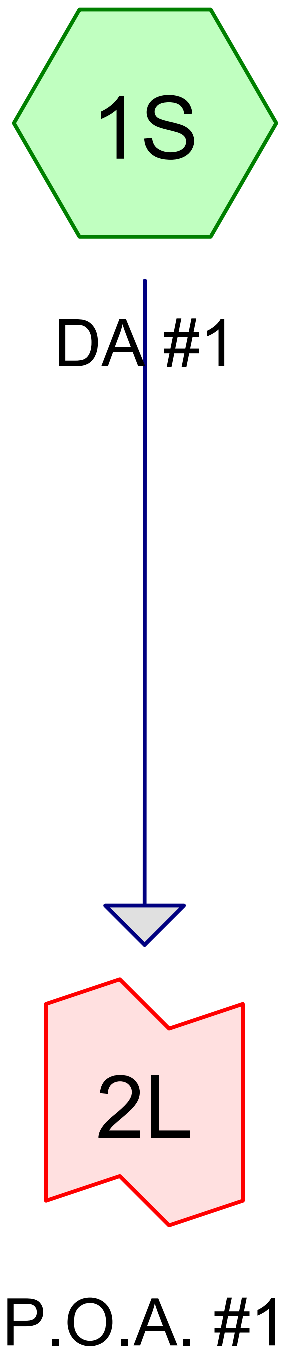
Summary for Link 2L: P.O.A. #1

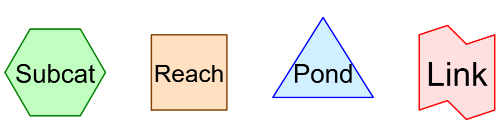
Inflow Area = 0.905 ac, Inflow Depth = 1.89" for 10-yr event
Inflow = 1.61 cfs @ 12.18 hrs, Volume= 0.142 af
Primary = 1.61 cfs @ 12.18 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: P.O.A. #1







Routing Diagram for POST-DEVELOPMENT
Prepared by Balzer & Associates, Inc, Printed 2/15/2023
HydroCAD® 10.20-2g s/n 07711 © 2022 HydroCAD Software Solutions LLC

Project Notes

Copied 7 events from VA-RAFORD NOAA storm
Copied 10 events from VA-Town_Pulaski 24-hr S1 storm

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	VA-Town_Pulaski 24-hr S1	1-yr	Default	24.00	1	1.96	2
2	2-yr	VA-Town_Pulaski 24-hr S1	2-yr	Default	24.00	1	2.37	2
3	10-yr	VA-Town_Pulaski 24-hr S1	10-yr	Default	24.00	1	3.49	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.370	74	>75% Grass cover, Good, HSG C (1S)
0.535	98	Paved parking, HSG C (1S)
0.905	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.905	HSG C	1S
0.000	HSG D	
0.000	Other	
0.905		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.370	0.000	0.000	0.370	>75% Grass cover, Good	1S
0.000	0.000	0.535	0.000	0.000	0.535	Paved parking	1S
0.000	**0.000**	**0.905**	**0.000**	**0.000**	**0.905**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=1.16"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=1.01 cfs 0.088 af

Link 2L: P.O.A. #1 Inflow=1.01 cfs 0.088 af
Primary=1.01 cfs 0.088 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.088 af Average Runoff Depth = 1.16"

Summary for Subcatchment 1S: DA #1

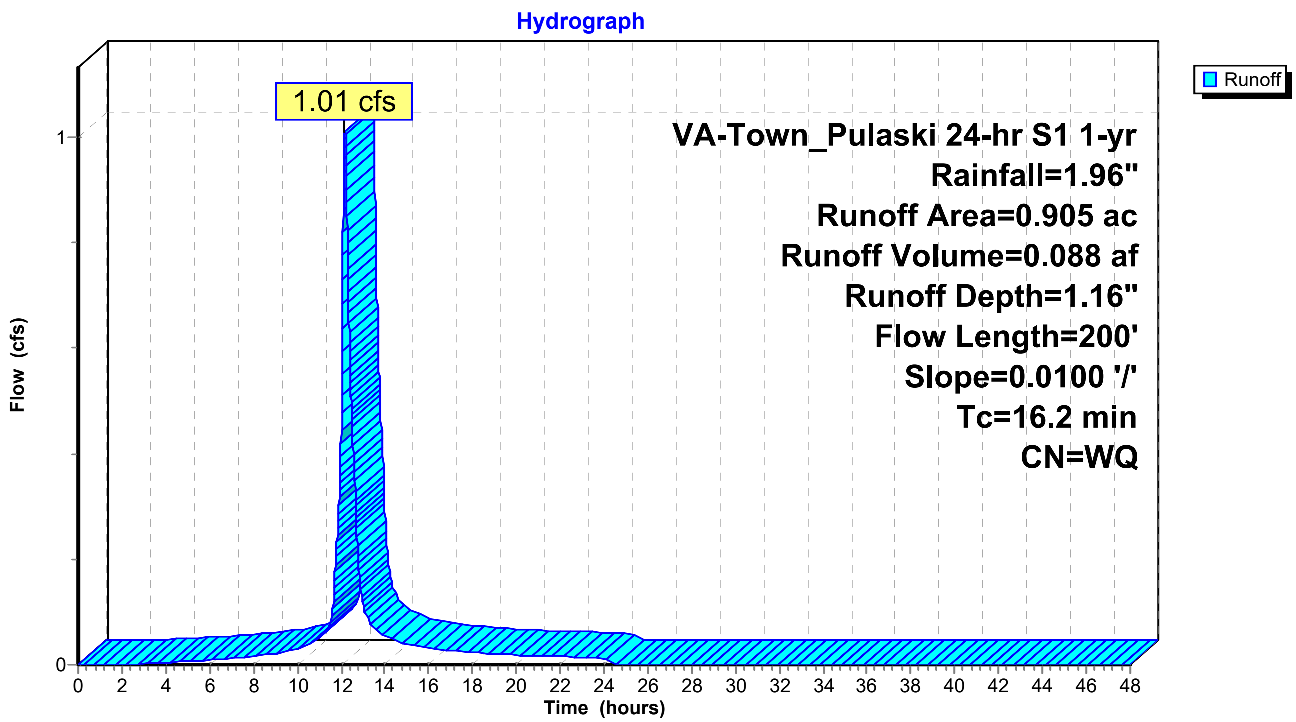
Runoff = 1.01 cfs @ 12.18 hrs, Volume= 0.088 af, Depth= 1.16"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 1-yr Rainfall=1.96"

Area (ac)	CN	Description
0.535	98	Paved parking, HSG C
0.370	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC3 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC4 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

Subcatchment 1S: DA #1

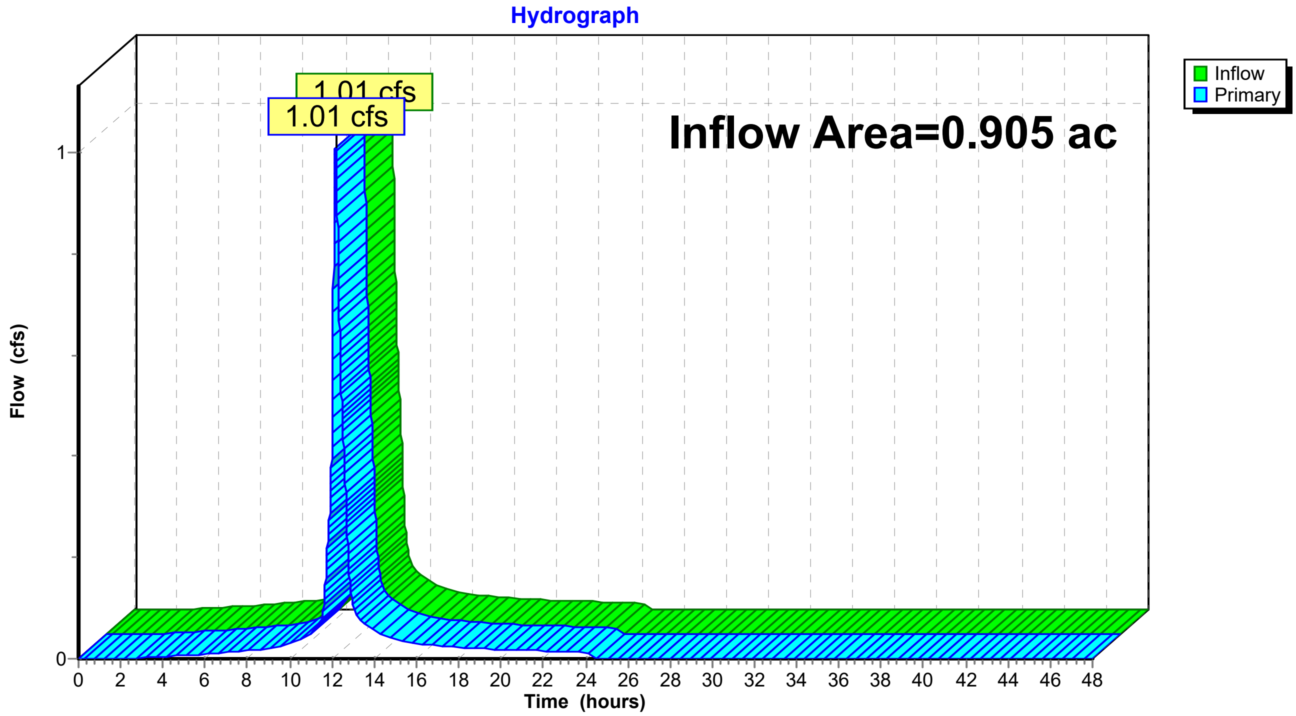


Summary for Link 2L: P.O.A. #1

Inflow Area = 0.905 ac, Inflow Depth = 1.16" for 1-yr event
Inflow = 1.01 cfs @ 12.18 hrs, Volume= 0.088 af
Primary = 1.01 cfs @ 12.18 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: P.O.A. #1



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=1.49"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=1.29 cfs 0.112 af

Link 2L: P.O.A. #1 Inflow=1.29 cfs 0.112 af
Primary=1.29 cfs 0.112 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.112 af Average Runoff Depth = 1.49"

Summary for Subcatchment 1S: DA #1

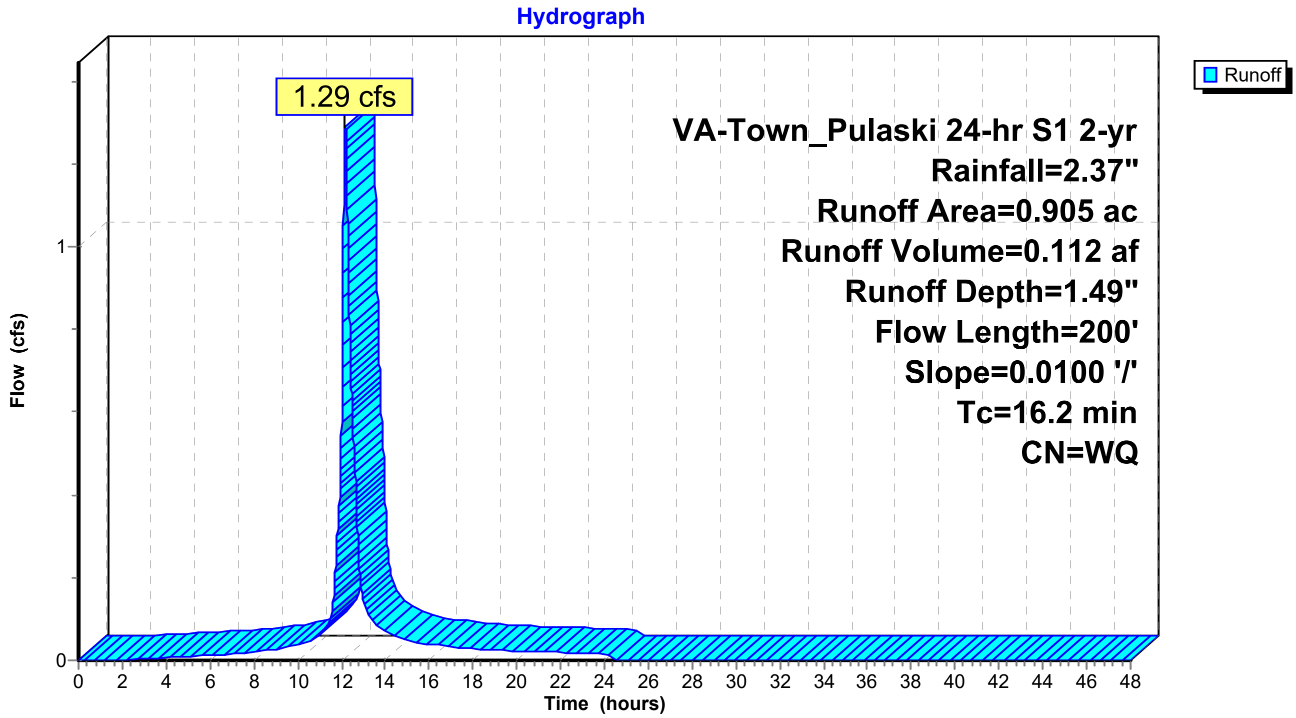
Runoff = 1.29 cfs @ 12.18 hrs, Volume= 0.112 af, Depth= 1.49"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 2-yr Rainfall=2.37"

Area (ac)	CN	Description
0.535	98	Paved parking, HSG C
0.370	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC3 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC4 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

Subcatchment 1S: DA #1

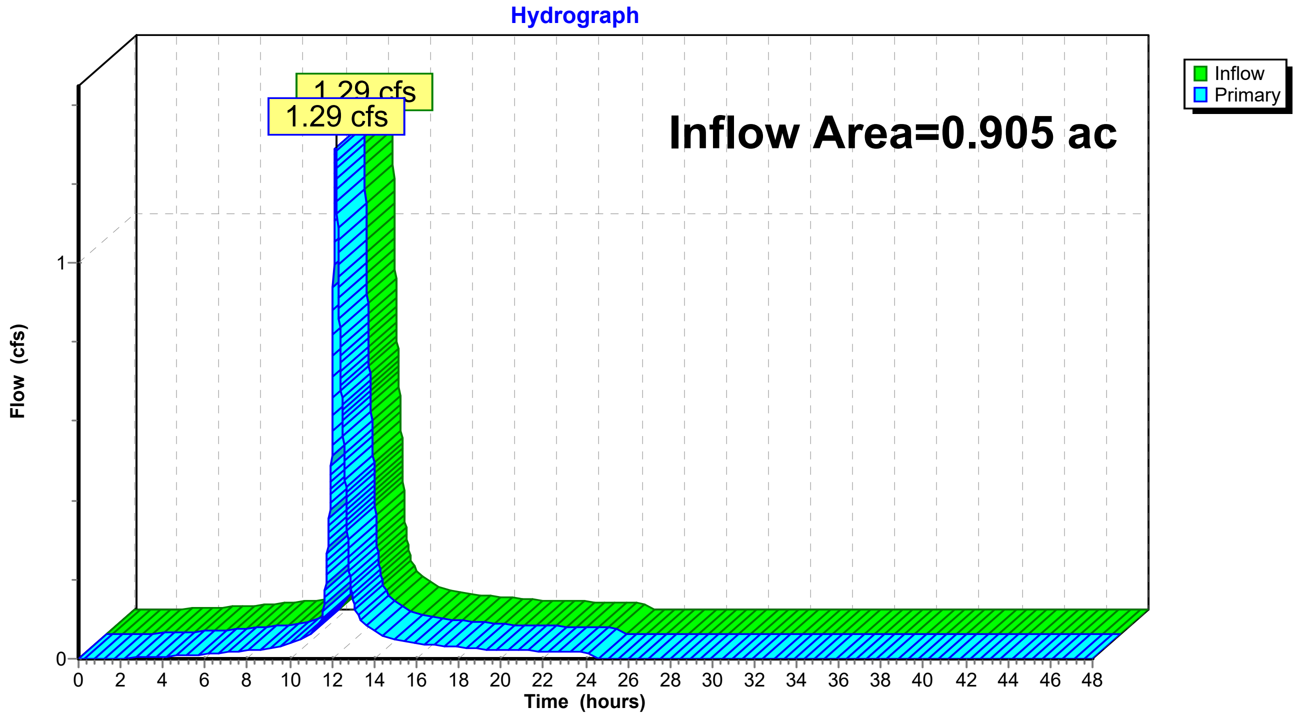


Summary for Link 2L: P.O.A. #1

Inflow Area =	0.905 ac,	Inflow Depth = 1.49"	for 2-yr event	
Inflow =	1.29 cfs @	12.18 hrs, Volume=	0.112 af	
Primary =	1.29 cfs @	12.18 hrs, Volume=	0.112 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: P.O.A. #1



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: DA #1 Runoff Area=0.905 ac Runoff Depth=2.43"
Flow Length=200' Slope=0.0100 '/' Tc=16.2 min CN=WQ Runoff=2.06 cfs 0.183 af

Link 2L: P.O.A. #1 Inflow=2.06 cfs 0.183 af
Primary=2.06 cfs 0.183 af

Total Runoff Area = 0.905 ac Runoff Volume = 0.183 af Average Runoff Depth = 2.43"

Summary for Subcatchment 1S: DA #1

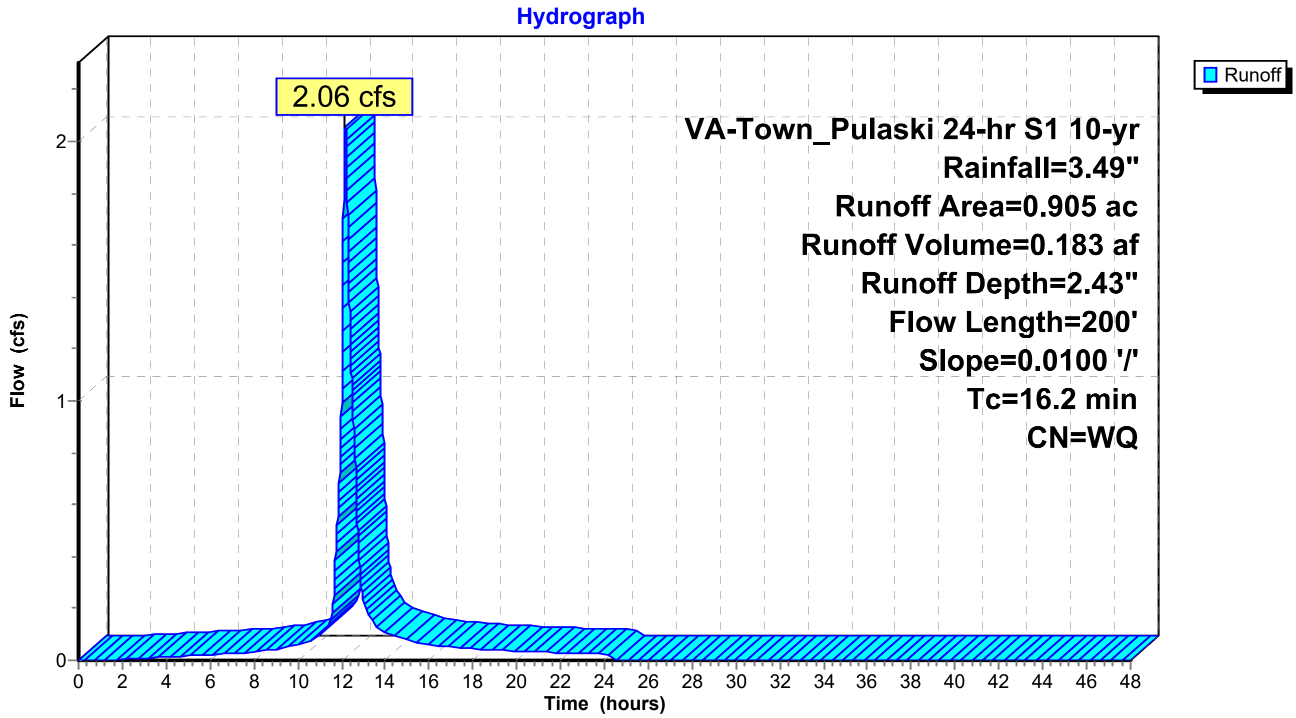
Runoff = 2.06 cfs @ 12.18 hrs, Volume= 0.183 af, Depth= 2.43"
Routed to Link 2L : P.O.A. #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
VA-Town_Pulaski 24-hr S1 10-yr Rainfall=3.49"

Area (ac)	CN	Description
0.535	98	Paved parking, HSG C
0.370	74	>75% Grass cover, Good, HSG C
0.905		Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0100	0.11		**Sheet Flow, TC3 OLF** Grass: Short n= 0.150 P2= 2.33"
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, TC4 SCF** Unpaved Kv= 16.1 fps
16.2	200	Total			

Subcatchment 1S: DA #1

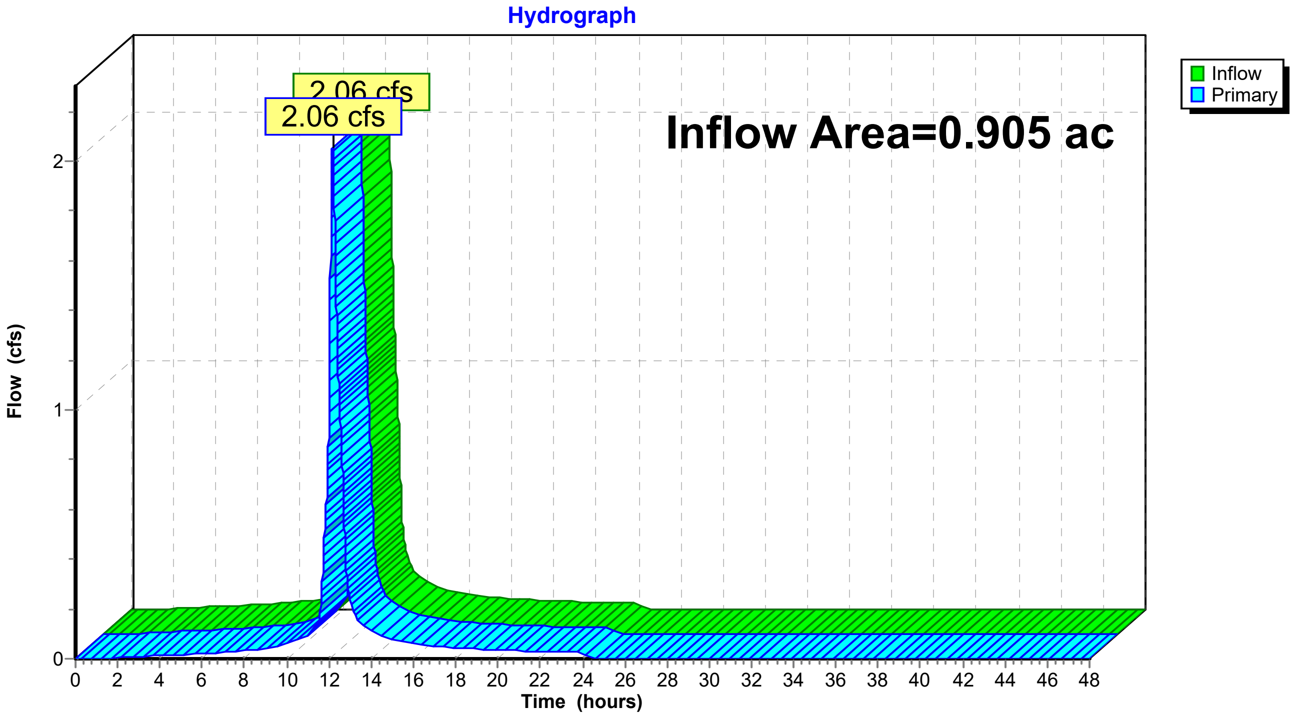


Summary for Link 2L: P.O.A. #1

Inflow Area =	0.905 ac, Inflow Depth = 2.43"	for 10-yr event	
Inflow =	2.06 cfs @ 12.18 hrs, Volume=	0.183 af	
Primary =	2.06 cfs @ 12.18 hrs, Volume=	0.183 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

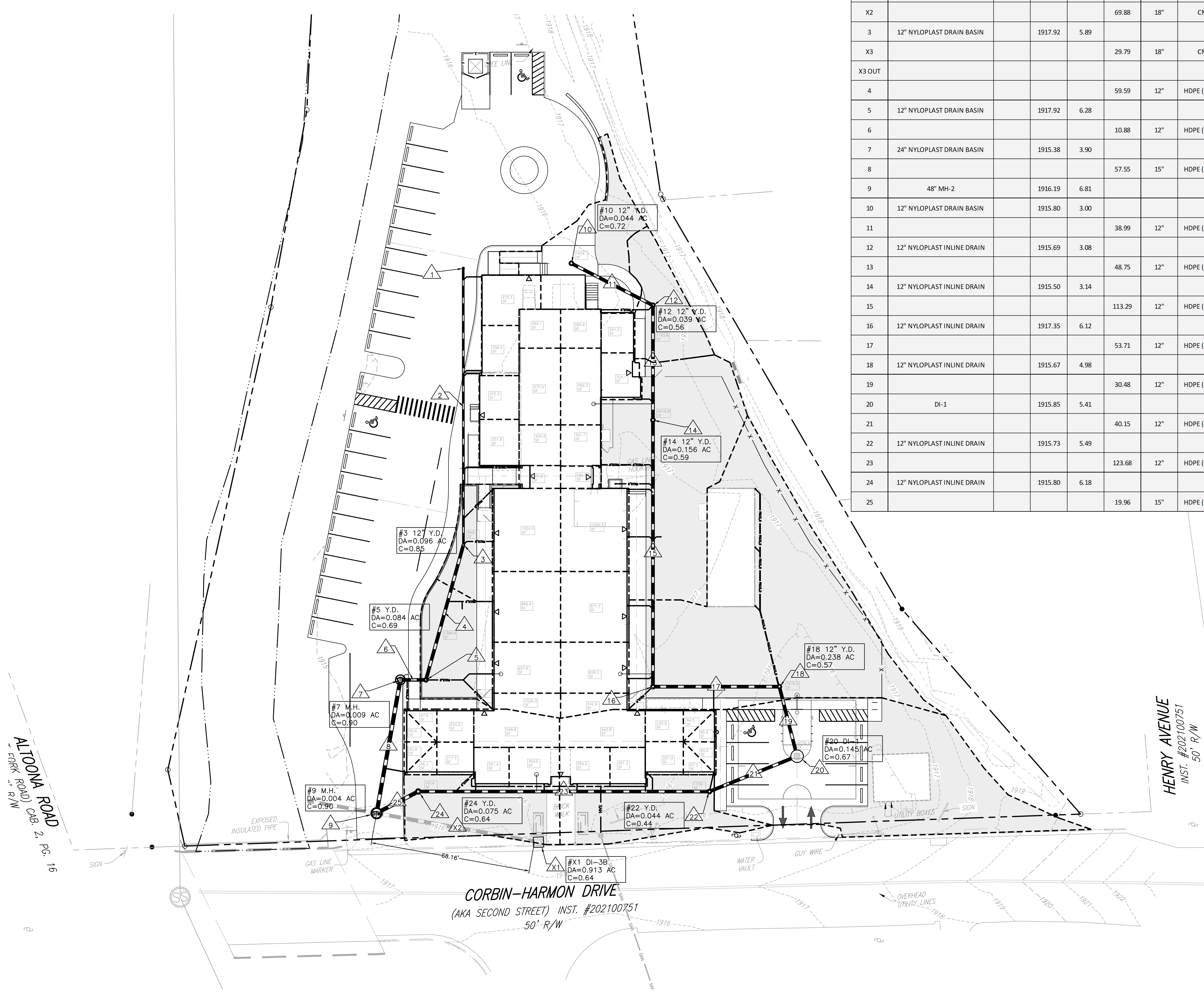
Link 2L: P.O.A. #1



APPENDIX C: DRAINAGE MAPS

STR#	TYPE	NOSE	TOP ELEV.	HEIGHT	LENGTH	DIAMETER	MATERIAL	SLOPE	INV. IN	INV. OUT	COMMENTS
1			1915.62	3.00							IS-1
X1	DI-3B	TYPE B	1915.96	5.10	4.00						IS-1, ST-1
2					117.42	8"	HDPE (TYPE S)	0.50%	1912.62	1912.03	
X2					69.88	18"	CMP	2.12%	1910.86	1909.38	
3	12" NYLOPLAST DRAIN BASIN		1917.92	5.89							Roof Drains: 3826 SF, half playground, STANDARD GRATE,
X3					29.79	18"	CMP	2.12%	1909.38	1908.75	
X3 OUT											
4					59.59	12"	HDPE (TYPE S)	0.67%	1912.03	1911.64	
5	12" NYLOPLAST DRAIN BASIN		1917.92	6.28							Roof Drains: 2288 SF, half playground, STANDARD GRATE,
6					10.88	12"	HDPE (TYPE S)	1.42%	1911.64	1911.48	
7	24" NYLOPLAST DRAIN BASIN		1915.38	3.90							No Surface, Roof Drains only: 414 SF, SOLID COVER,
8					57.55	15"	HDPE (TYPE S)	3.64%	1911.48	1909.39	
9	48" MH-2		1916.19	6.81							Doghouse Manhole, one roof drain: 192SF,
10	12" NYLOPLAST DRAIN BASIN		1915.80	3.00							refrigerator shed roof, 618 sf Lawn, STANDARD GRATE,
11					38.99	12"	HDPE (TYPE S)	0.50%	1912.80	1912.61	
12	12" NYLOPLAST INLINE DRAIN		1915.69	3.08							Roof Drains: 526.8 SF, STANDARD GRATE,
13					48.75	12"	HDPE (TYPE S)	0.50%	1912.61	1912.36	
14	12" NYLOPLAST INLINE DRAIN		1915.50	3.14							Roof Drains: 2379 SF Other Imprv: 595 SF, STANDARD GRATE,
15					113.29	12"	HDPE (TYPE S)	1.00%	1912.36	1911.23	
16	12" NYLOPLAST INLINE DRAIN		1917.35	6.12							JUNCTION ONLY, 90 DEGREE TURN, LEAVING BLANK > #18,
17					53.71	12"	HDPE (TYPE S)	1.00%	1911.23	1910.69	
18	12" NYLOPLAST INLINE DRAIN		1915.67	4.98							Roof Drains: 2698SF, 0.14 AC lawn, 1599SF other Imprv, STANDARD
19					30.48	12"	HDPE (TYPE S)	0.50%	1910.69	1910.54	
20	DI-1		1915.85	5.41							New Parking, WD bldg, Lawn, IS-1, ST-1
21					40.15	12"	HDPE (TYPE S)	0.50%	1910.44	1910.24	
22	12" NYLOPLAST INLINE DRAIN		1915.73	5.49							159 sf other imprv, 1551 SF lawn, 193 SF Roof, STANDARD GRATE,
23					123.68	12"	HDPE (TYPE S)	0.50%	1910.24	1909.62	
24	12" NYLOPLAST INLINE DRAIN		1915.80	6.18							Roof Drains: 1656 SF 1476 SF lawn, STANDARD GRATE,
25					19.96	15"	HDPE (TYPE S)	0.70%	1909.62	1909.48	

INLET DRAINAGE MAP



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JAMES RICHARD TAYLOR
Lic. No. 55142
2/9/2023
PROFESSIONAL ENGINEER

CALFEE COMMUNITY & CULTURAL CENTER

INLET DRAINAGE MAP

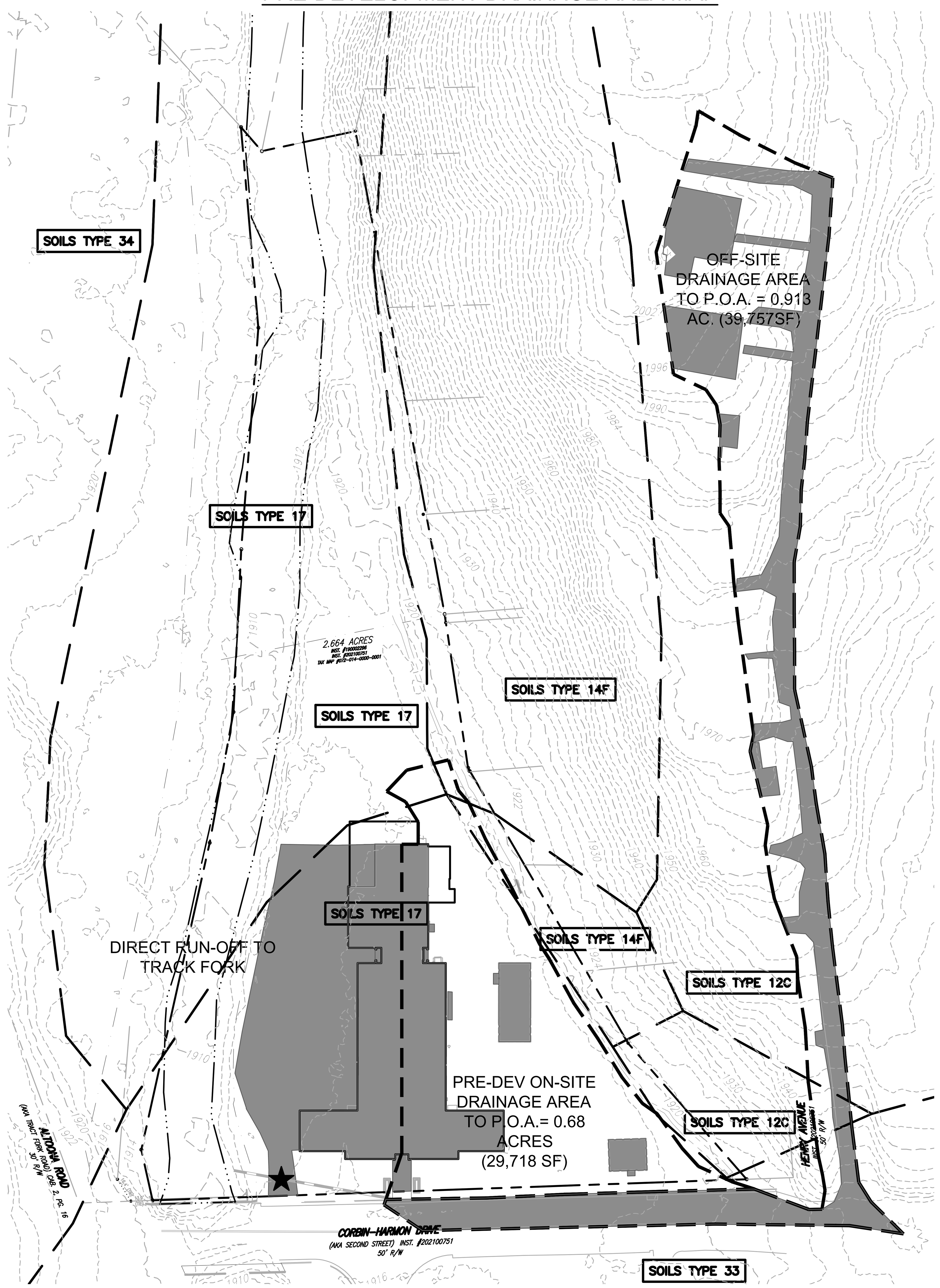
1 CORBIN-HARMON DRIVE
TOWN OF PULASKI, VIRGINIA

DRAWN BY	MSL
DESIGNED BY	MSL
CHECKED BY	JRT
DATE	2/9/2023
SCALE	1" = 50'
REVISIONS	

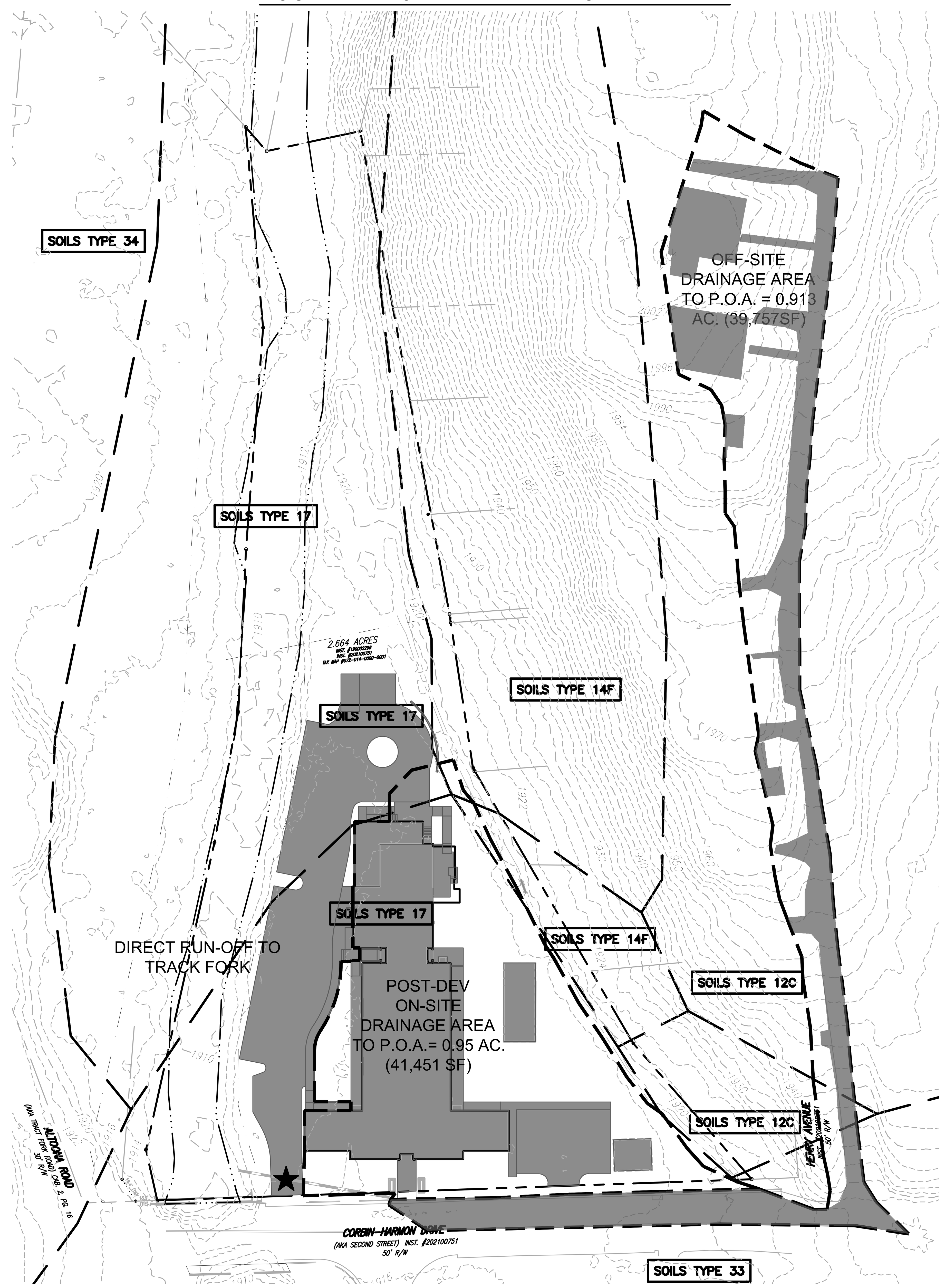
C11

PROJECT NO. 23220008.00

PRE-DEVELOPMENT DRAINAGE AREA MAP



POST-DEVELOPMENT DRAINAGE AREA MAP



LEGEND:

- IMPERVIOUS AREA
- DRAINAGE BOUNDARY
- SOIL TYPE LINE

SOILS MAP LEGEND:

MAP UNIT SYMBOL	HYDROLOGIC SOIL GROUP	MAP UNIT NAME
12C	TYPE C	GROSECLOSE-URBAN LAND COMPLEX (7 TO 15 PERCENT SLOPES)
14C	TYPE D	KLINESVILLE-BERKS CHANNERY SILT LOAMS (7 TO 15 PERCENT SLOPES)
14F	TYPE D	KLINESVILLE-BERKS CHANNERY SILT LOAMS (30 TO 65 PERCENT SLOPES)
17	TYPE C	LINDSIDE-NOLIN SILT LOAMS
33	N/A	URBAN LAND
34	TYPE B	WHEELING SANDY LOAM
W	N/A	WATER

NAD83

50 0 50 100 150
1" = 50'

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2/9/2023
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DRAINAGE AREA MAPS

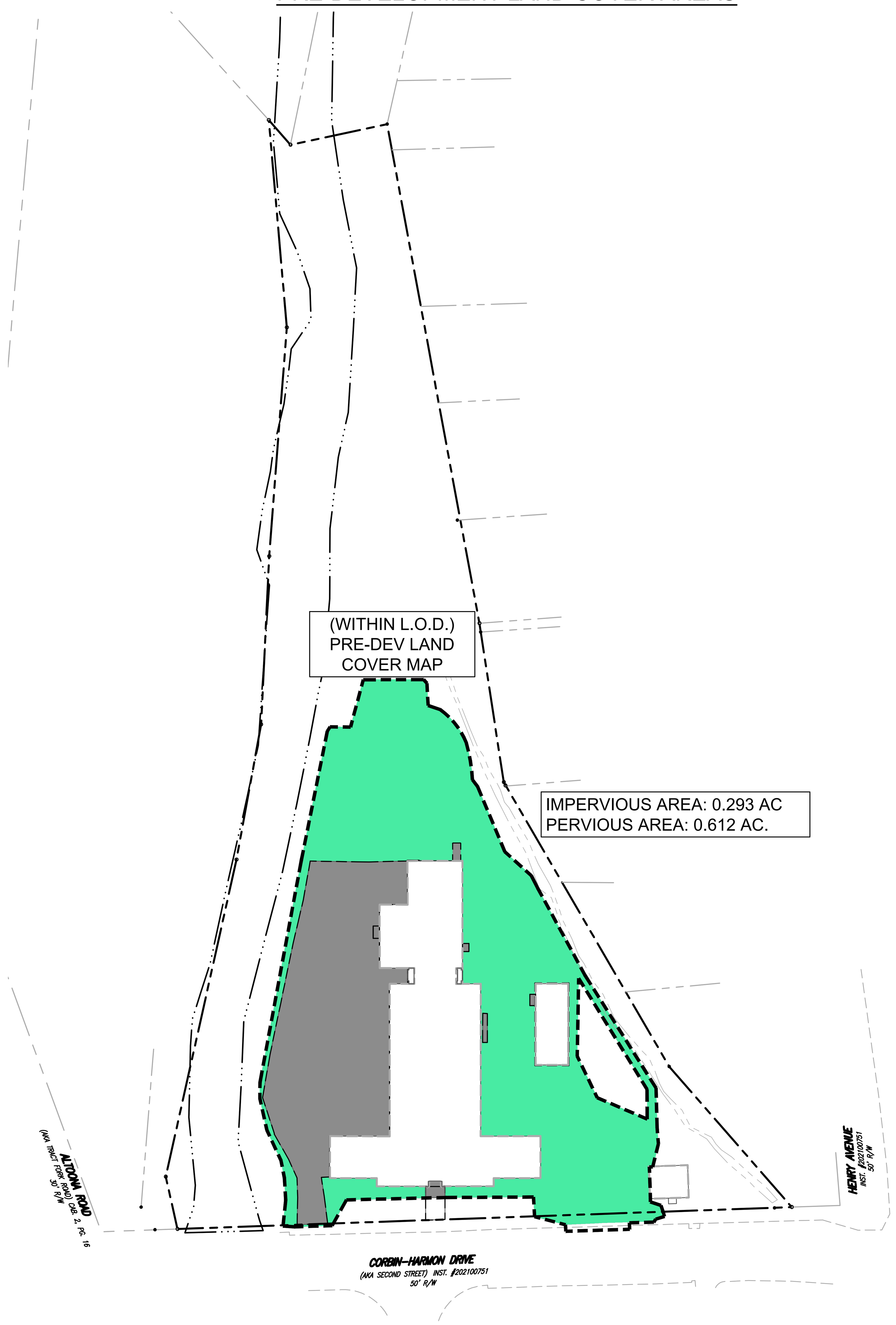
1 CORBIN-HARMON DRIVE
TOWN OF PULASKI, VIRGINIA

DRAWN BY	MSL
DESIGNED BY	MSL
CHECKED BY	JRT
DATE	2/9/2023
SCALE	1" = 50'
REVISIONS	

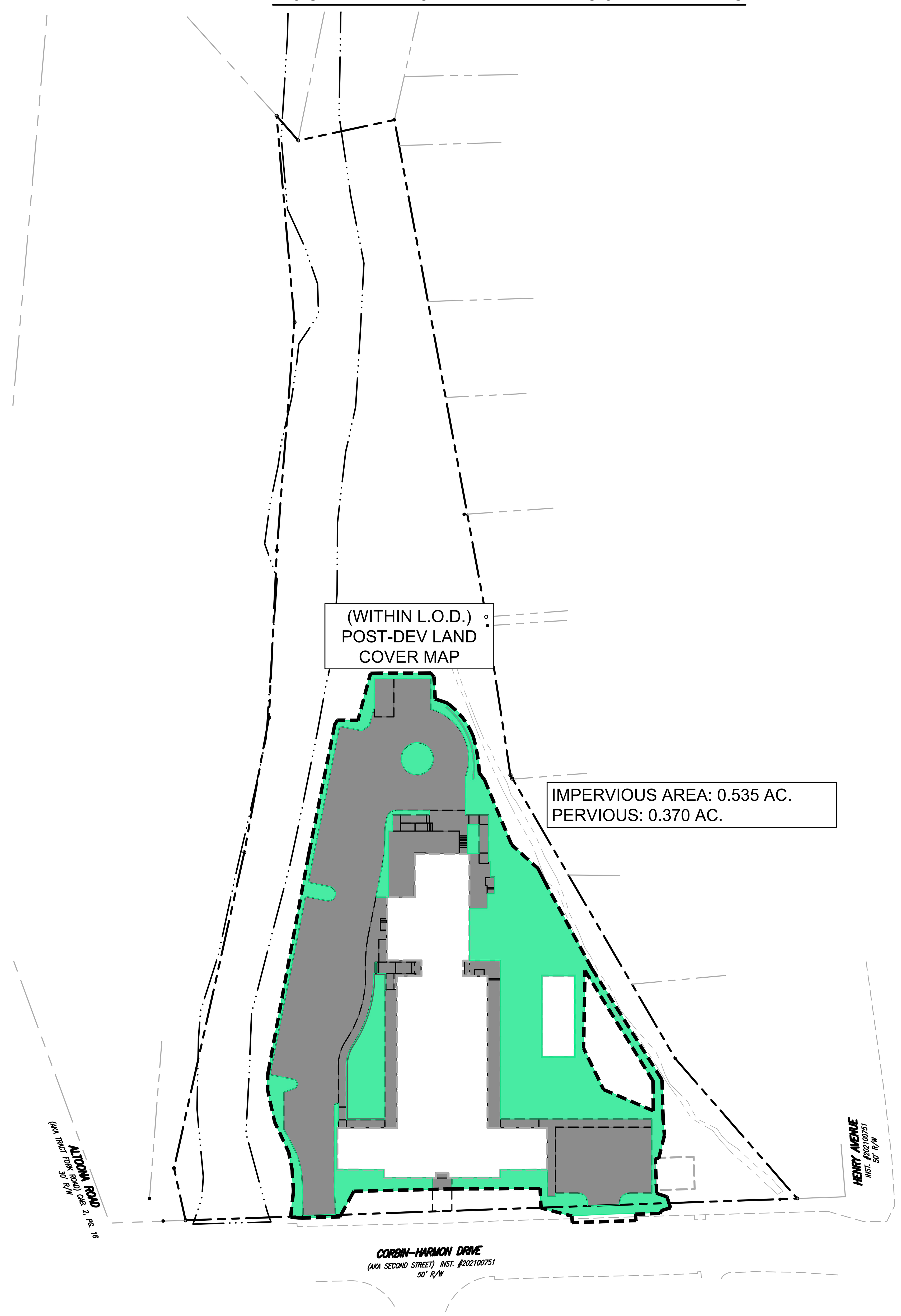
C7

PROJECT NO. 23220008.00

PRE-DEVELOPMENT LAND COVER AREAS



POST-DEVELOPMENT LAND COVER AREAS



LEGEND:

- IMPERVIOUS AREA
- PERVIOUS AREA
- LIMIT OF DISTURBANCE BOUNDARY

50 0 50 100 150

1" = 50'

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L.O.D. LAND COVER MAPS

1 CORBIN-HARMON DRIVE
TOWN OF PULASKI, VIRGINIA

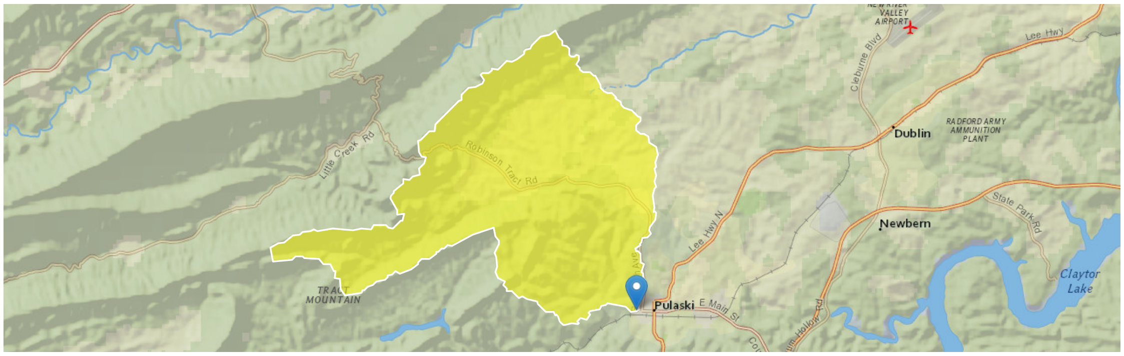
DRAWN BY	MSL
DESIGNED BY	MSL
CHECKED BY	JRT
DATE	2/15/2023
SCALE	1" = 50'
REVISIONS	

C12

PROJECT NO. 23220008.00

StreamStats Report

Region ID: VA
Workspace ID: VA20230207193722226000
Clicked Point (Latitude, Longitude): 37.04804, -80.78663
Time: 2023-02-07 14:37:50 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	25.5	square miles

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Valley and Ridge 2011 5144]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.5	square miles	0.06	7866

Peak-Flow Statistics Flow Report [Valley and Ridge 2011 5144]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
50-percent AEP flood	1210	ft^3/s	22
42.9-percent AEP flood	1380	ft^3/s	23
20-percent AEP flood	2240	ft^3/s	24
10-percent AEP flood	3110	ft^3/s	27
4-percent AEP flood	4410	ft^3/s	31
2-percent AEP flood	5530	ft^3/s	35
1-percent AEP flood	6730	ft^3/s	39
0.5-percent AEP flood	8150	ft^3/s	43

Peak-Flow Statistics Citations

Austin, S.H., Krstolic, J.L., and Wiegand, Ute,2011, Peak-flow characteristics of Virginia streams: U.S. Geological Survey Scientific Investigations Report 2011–5144, 106 p. + 3 tables and 2 appendixes on CD. (http://pubs.usgs.gov/sir/2011/5144/)

Application Version: 4.12.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1